

# ARIZONA MEDICINE

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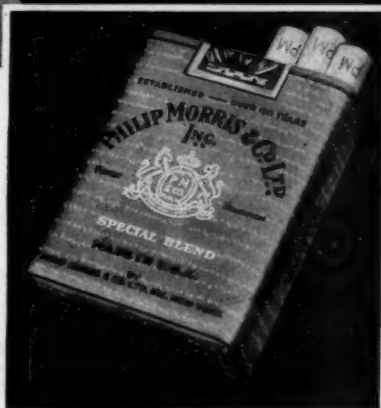
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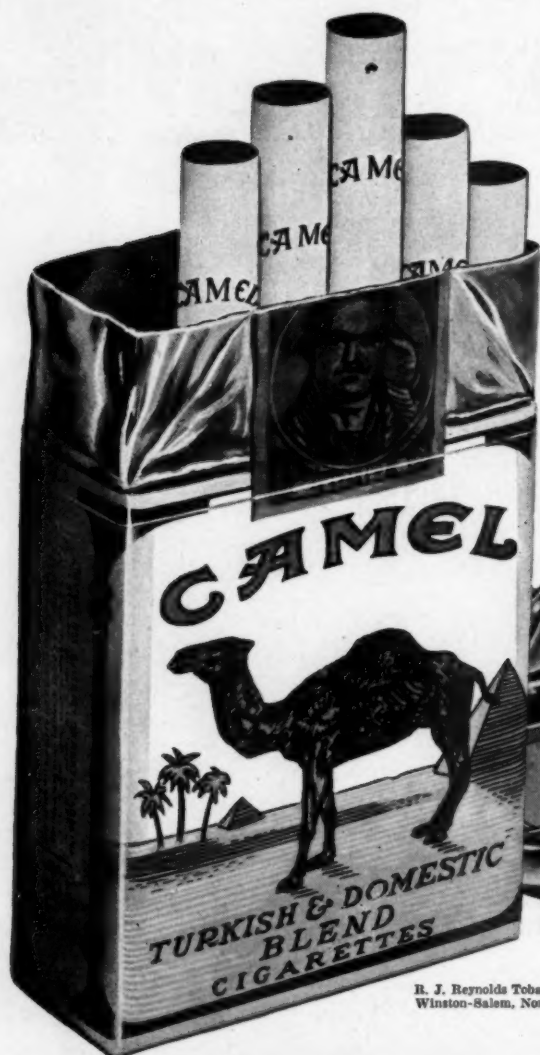
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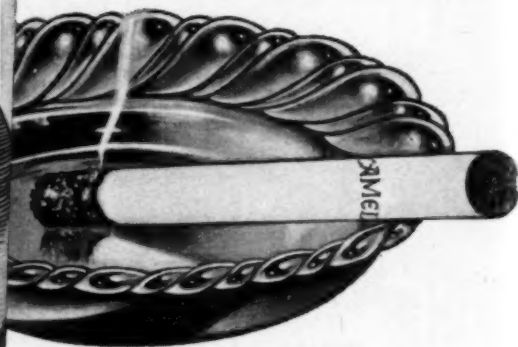
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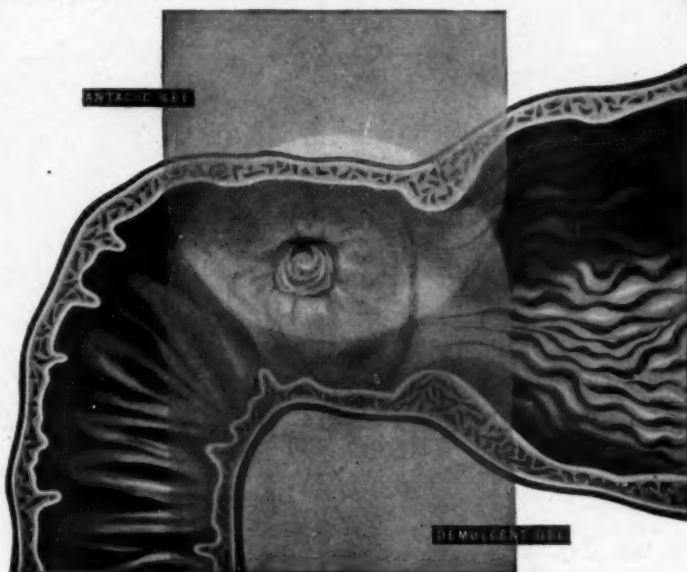


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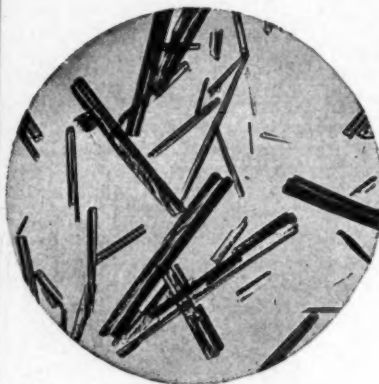
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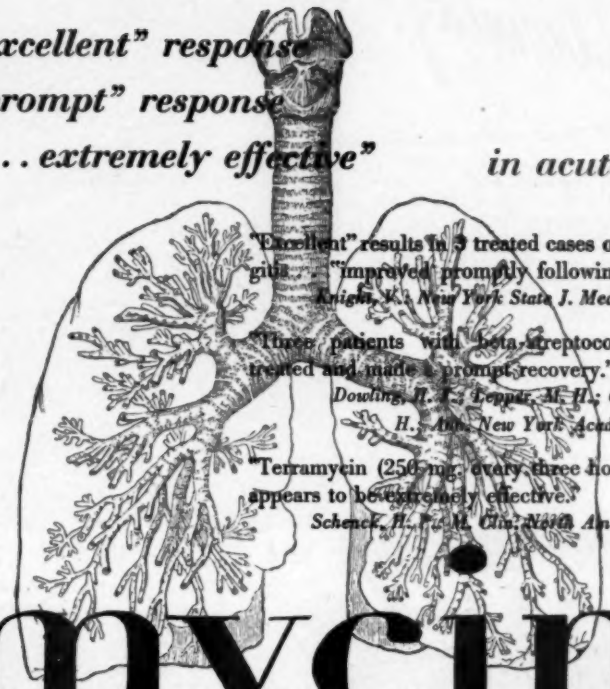
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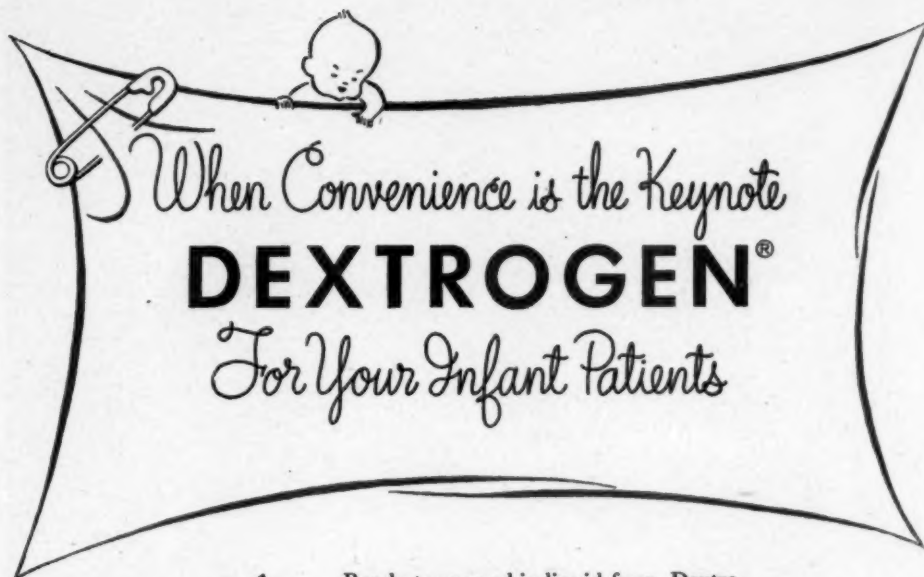
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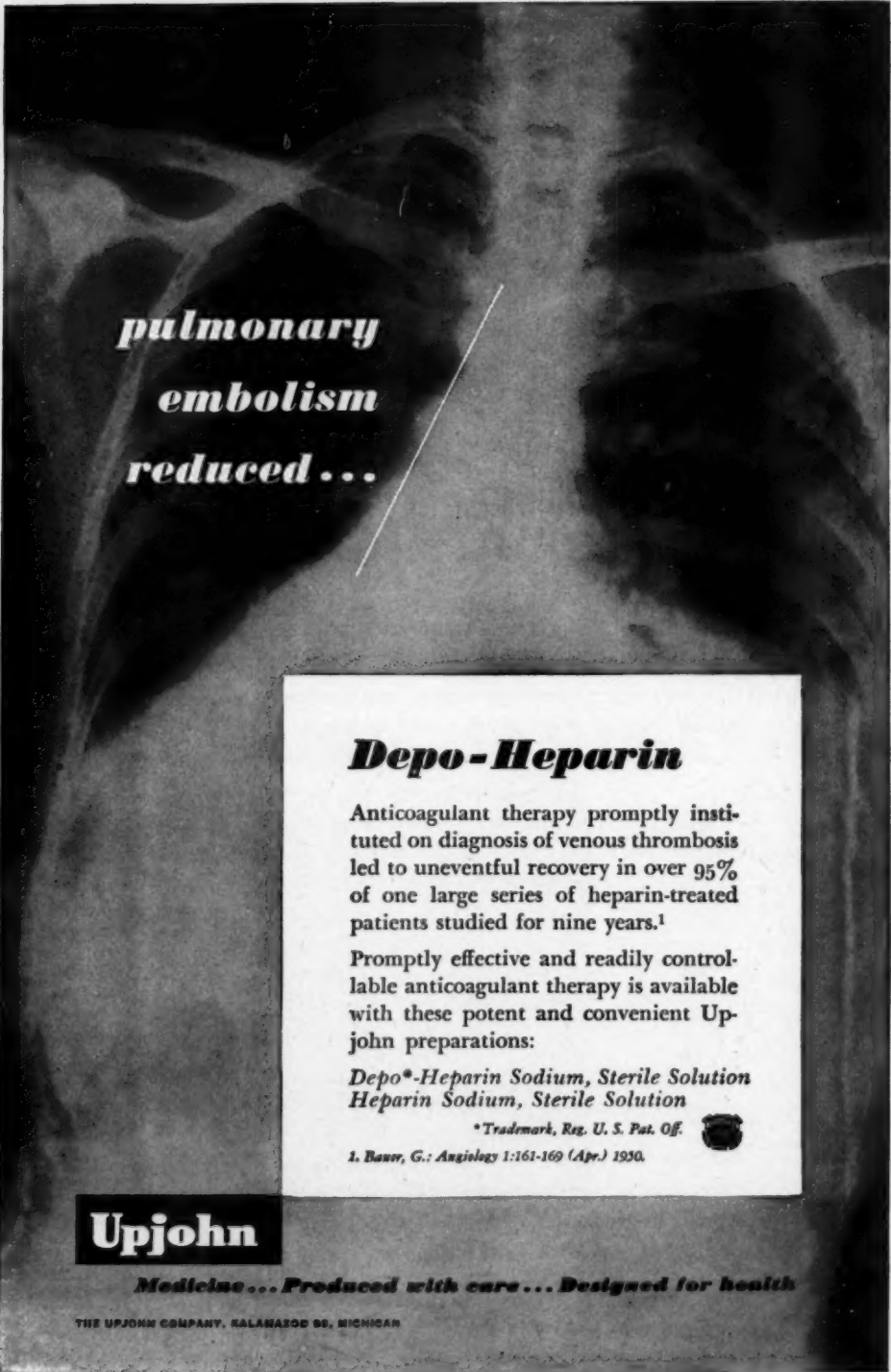
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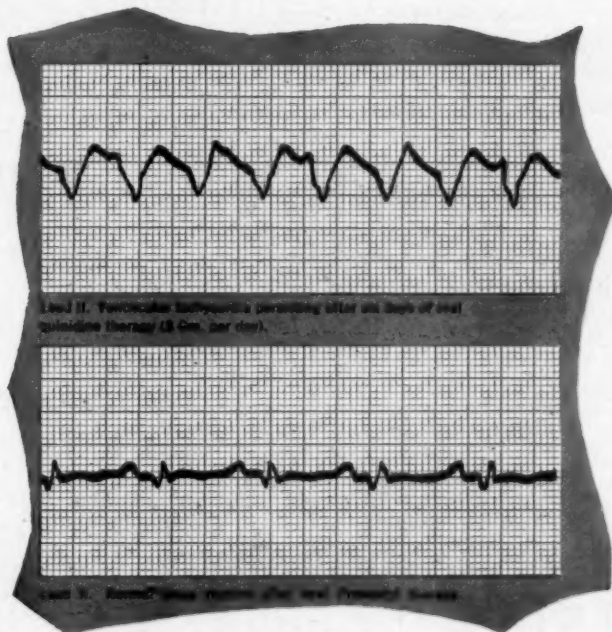
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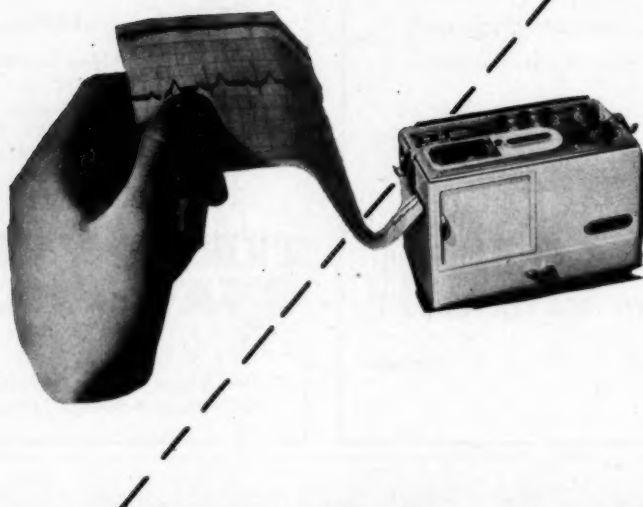
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# ARIZONA MEDICINE

*Journal of* ARIZONA MEDICAL ASSOCIATION

VOL. 8, NO. 3  MARCH, 1951

## INDICATIONS FOR RESECTION IN PULMONARY TUBERCULOSIS\*

PAUL C. SAMSON, M. D.\*\*

Oakland, California

Resection as a treatment in pulmonary tuberculosis is now undergoing a third wave of restrained enthusiasm. The first period in the modern era was approximately from 1935 to 1940 and coincided with the development of individual ligation technique in pneumonectomy and preliminary improvements in anesthesia. Early optimism was followed by extreme pessimism particularly in relation to lobectomies; inevitable empyemas and bronchial fistulae accompanied tourniquet ligation in lobectomy and these were frequently followed by both early and late tuberculous spreads. Such complications proved to be much more serious in patients with tuberculosis than in patients with chronic non-specific suppuration. The second (or pre-streptomycin) period occurred between 1940 and 1946, and followed the standardization of individual ligation technique for lobectomy, further improvements in anesthesia and the free use of blood replacement therapy. Early empyemas and fistulae were greatly reduced but there were late infections and reactivations which left five-year end-results with much to be desired (1). Another factor, at least in certain series, was the mistaken idea that the tuberculous infection could be totally removed by lobectomy or pneumonectomy. Many patients were not kept at bed rest for a sufficient period of time following resection. Thus, a group of 30 patients who were not subjected to bed rest following resection has been investigated by Dugan (2). Immediately following operation there was one death (3.3%) and three spreads (13%). Nine months later there had been two additional deaths from tuberculosis (10%) and seven additional spreads of tuberculosis (36.6%).

The present or third period is the era of antibacterial therapy and commenced when streptomycin (more recently PAS and Tibione) became available in 1946. Comparative studies (3) (4) (5) now indicate unequivocally that surgical prophylaxis with streptomycin has greatly reduced the immediate hazards of resection in tuberculosis. The specters of fistula-empyema, spreads and reactivations are much less frightening than before. We have come to realize, too, that seldom, if ever, is all the tuberculosis removed. A period of bed rest, preferably for six months, should certainly follow resection. The elapsed time is too brief to tabulate later results, but the indications are that they will be appreciably better than in the pre-antimicrobial era.

It is important to state here our conclusions concerning the administration of streptomycin and PAS. Early enthusiasms and lack of precedent led to larger dosage regimens than are now considered necessary. Types of disease now known to respond poorly were originally treated uncritically. The history of these trials and tribulations is common knowledge and I will not elaborate. Suffice it to say the emergence of resistant strains has been of great concern to the surgeon as well as to the internist. In our experience, patients whose bacilli were highly resistant to streptomycin have been poor candidates for resection. Jones and Robinson (3) believe such a situation may actually be a contra-indication to resection. They operated on eight patients who were streptomycin-resistant and all developed serious complications. Whether or not PAS alone, perhaps reinforced with intravenous PAS during the immediate post-operative period, will be an adequate substitute in patients with streptomycin-resistant organisms is a subject for present and future investigation.

\*Presented at the Annual Meeting of the Pima County Medical Society at the Veterans Administration Hospital, Tucson, Arizona, May 9, 1950.

\*\*Associate Clinical Professor of Surgery, Stanford University School of Medicine; Area Consultant in Thoracic Surgery, Veterans Administration.

The obvious corollary is that streptomycin cannot be given indiscriminately with impunity. Certain care and judgment must be exercised in its administration under a medical regimen. It should be standard procedure that where streptomycin boards exist, a thoracic surgeon should be a member of the team. The possibility of eventual resection may then be more adequately assayed and the early administration of streptomycin for the patient in question more intelligently regulated. Since the combined administration of streptomycin and PAS delays the emergence of resistance these drugs always should be given together. With the information now available, a safe intermittent dosage-schedule may be selected for the initial regimen. A later intensive course may be so timed that resection can be performed within the period of expected sustained sensitivity.

#### CONTRAINDICATIONS TO RESECTION

Certain contraindications to pulmonary resection should be briefly discussed. (1) In general, patients with other difficulties such as cardiovascular renal disease, etc., are not good subjects for resection. The patient must be fit for major surgery. A moderate decrease in pulmonary function may not be a contraindication to resection. Thus, Gaensler and Strieder (15) have shown that there is no great difference between lobectomy and thoracoplasty in decreasing pulmonary function. (2) Ulcerative tuberculous bronchitis. To me, this is an absolute contraindication to resection. Incision through a bronchus which is actively diseased is an open invitation to fistula and empyema. (3) Acute exudative disease on either side contraindicates resection at the time. Active disease in the contralateral lung, per se, if it is controlled and stable does not contraindicate resection if the pulmonary function is adequate. In this situation, antimicrobial therapy may be administered for a longer period of time after operation than would ordinarily be employed for surgical prophylaxis. Pneumoperitoneum and pneumothorax likewise should be considered as important factors of the post-surgical therapeutic program.

#### GENERAL INDICATIONS

There are two general situations in which resection may be indicated. The first of these concerns the status of the bronchial system. I agree with Jones that various aspects of bronchial disease are fruitful sources of resection material.

Bronchial stenoses may affect the stem bronchus. This ordinarily leads to consideration of pneumonectomy since lobectomy is not a safe procedure distal to a stenosis. In cases of lobar stenosis, lobectomy should be considered. It is of importance that the upper lobes be directly inspected with a right angle telescope if stenosis of these bronchi is to be accurately diagnosed. Intrapulmonary tuberculous bronchitis and bronchiectasis if diagnosed or suspected would make resection the more logical procedure.

The second of the situations regards the type and position of cavities, and their reaction under pneumothorax, pneumoperitoneum or incomplete thoracoplasty. Giant or tension cavities are known to be notoriously difficult to close with thoracoplasty. While it has been done successfully, it is usually at the expense of an increased number of stages and a probable undue decrease in pulmonary function. Cavities in the anterior segments of the upper lobes, the right middle lobe, the lingula or in the lower lobes are likewise difficult to collapse by thoracoplasty. Resection should be considered for cavities in these locations and is by all odds the treatment of choice in middle and lower lobe cavities. Certain cavities balloon or show sudden decreases and increases in size under pneumothorax and pneumoperitoneum. Some of these cavities show no decrease in size even with extensive pneumothorax. Cavities of this type are not favorable for thoracoplasty and resection should be considered. The behavior of a cavity following one or two stages of a thoracoplasty may counsel resection. If the cavity increases in size, particularly if it balloons up *above* the unresected ribs, the next operation usually should be resection rather than further stages of a thoracoplasty.

If resection is decided upon, no commitment should be given the patient for segmental resection, lobectomy or pneumonectomy. In general, resection should be aimed at saving relatively normal parenchyma. It is often a matter of fine judgment at the time of operation to decide upon the limits of resection. The choice of procedure is determined by the amount and type of disease seen in the x-ray and palpated in the lung, and the location of stenoses. In rare instances, a contemplated lobectomy becomes a pneumonectomy because of technical difficulty with adhesions, the complete loss of normal fissural markings and operative accidents (tearing of arteries).

There are certain commonly accepted specific indications for resection in tuberculosis.

1. *Unsuccessful Thoracoplasty.* Sharp distinction should be made between lack of success because of a technically poor thoracoplasty and an adequate thoracoplasty which fails because of the type of disease. If the patient has been improved and the disease brought under partial control by a poor thoracoplasty, a revision operation probably should be performed in preference to resection. Certain types of disease, however, mitigate against success in thoracoplasty: bronchial involvement, thick-walled cavities and giant or tension cavities. If such exist, resection is to be preferred rather than secondary (revision) thoracoplasty.

2. *Destroyed Lung.* A lung may be destroyed because of extensive tuberculous disease throughout or because of the presence of secondary suppuration or bronchiectasis. Thoracoplasty has little to offer in either situation. I believe it to be actually contraindicated if clinical pyogenic infection is present.

3. *Tuberculoma.* This broad term is probably employed too loosely in many instances. It covers, however, true granulomas of the lung as well as the solid rounded shadows which eventually prove to be thick-walled cavities filled with partially inspissated caseous debris. It is common experience that collapse procedures have little to offer in the permanent control of these lesions. Since it has been proved that there is an appreciable risk of spread if the lesions are untreated, resection appears to be the treatment of choice. There has been considerable discussion as to whether such lesions should attain a critical size before removal becomes advisable; there is no absolute answer to this question at present. It is probable that any lesion which increases in size should be removed but I hesitate to remove a tuberculoma which is less than a centimeter in diameter unless the exact nature of the round shadow cannot be determined by appropriate tests.

4. *Problems of the Unexpanded Lung.* In certain patients with unexpanded lung, resection should be considered as one facet of a combined surgical attack. The dictum of preservation of relatively normal parenchyma makes some of these problems quite difficult from the surgical point of view, since it is far easier technically to perform a pneumonectomy. Evaluation of the pulmonary condition prior to pneumothorax is

of the utmost importance since the success of decortication is dependent upon at least one expandable lobe. In this situation, it makes no particular difference whether the non-expansion is complicated by pleural effusion or by a tuberculous empyema. If one of the lobes contains persistent active disease or a cavity, decortication should be combined with lobectomy. Thoracoplasty should be done at the same time or as soon as possible to prevent over-expansion of the remaining lobes. If there is inactive disease in one lobe but the lobe is fibrotic, decortication should be performed on the relatively normal lobe and a small thoracoplasty done at the same time to collapse permanently the non-expandable lobe.

#### NEWER TECHNIQUES COMBINED WITH RESECTION

Within the past two years, several techniques have been developed which have as their aim both the extension of indications for lobectomy and the increased preservation of relatively normal parenchyma. It is important to discuss these techniques briefly in the light of their probable worth.

Chamberlain (6) (7) has interested himself in segmental resection for tuberculous lesions. While segmental resection, in general, has been practiced with increasing frequency during the past few years, Chamberlain is the first so far as I know to apply the technique intensively to excisional problems in tuberculosis. Recently, he reported his experiences with one hundred segmental resections. There was a 3% mortality. Chamberlain stresses that he removes only the main offending lesion and deliberately leaves behind modular disease on many occasions. He has found that lateral tomography is of great assistance in deciding upon the extent of segmental resection. Late results cannot be reported at this time but segmental resection undoubtedly has considerable merit in many cases.

Sarot (8) has recently published his experiences with extra-pleural pneumonectomy and pleurectomy. He and his coworkers are convinced that the pleura itself is a tissue showing marked decreased resistance to tuberculous infection and believe it should be removed almost routinely in pneumonectomy. The use of this technique likewise has made possible the removal in toto of a badly diseased lung and extensive empyema without actually entering the pleural cavity and, therefore, without contamina-

tion of the intrathoracic space or the operative field.

Gebauer (9) (10) has investigated the possibilities of plastic reconstruction of stenosed bronchi by means of dermal grafts. Rarely pneumonectomy has been necessary because of high grade stenosis of the main stem bronchus, when the active disease was confined to an upper lobe. This has resulted in sacrifice of completely normal parenchyma on more than one occasion, since lobectomy distal to a stenosis is not a feasible procedure. In a number of instances Gebauer has been able to save a normal lower lobe by proceeding with the indicated resection, then incising through the stenosed bronchus posteriorly and enlarging it by means of a dermal graft. The procedure is a highly technical one but has enjoyed considerable success in Gebauer's skillful hands.

There is general agreement among thoracic surgeons that over-expansion of remaining lung tissue following lobectomy in tuberculosis is undesirable. In most instances, a delayed thoracoplasty has been performed to prevent over-distension but we believe that even short term over-expansion should be prevented if possible. Following Iverson and Skinner's (11) reports of pneumonectomy and concomitant thoracoplasty which appeared 14 months ago we became interested in this problem and proceeded with primary upper lobe lobectomy and concomitant thoracoplasty in a number of patients (12). Experience during the past 14 months with some 25 cases has proved that there is no additional morbidity or mortality if a limited thoracoplasty is combined with lobectomy. Our preliminary results has been sufficiently gratifying so that the combined procedure is now used almost routinely with primary upper lobectomies.

#### THORACOPLASTY VERSUS PRIMARY RESECTION

In any clinic where an appreciable number of resections are performed, there are well known difficulties in attempting uniformly to decide what constitutes an indication for primary lobectomy. The success or failure of the surgeon with both lobectomy and thoracoplasty (including his most recent case) varying attitudes of the medical consultant, the individual interpretation of roentgen films in regard to the actual pulmonary pathology, the general status of the patient, and the bronchoscopic findings are all factors which need but to be listed. There is likewise

the growing realization that thoracoplasty may not be the ideal operation for all chronic tuberculosis; that thoracoplasty results differ considerably if the type of pulmonary pathology is taken into consideration. The recent report of Rubin and Klopstock (13) and Steele's editorial (14) stress the validity of this concept in an excellent manner. With these factors in mind, the history, pre-operative estimation of pathology and post-operative specimens were reviewed in a series of 35 primary upper lobectomies. Over 50% demonstrated pre-operatively what were believed to be primary indications for resection, following the suggestions of Rubin: giant or tension cavities, solid lesions, secondary pyogenic infection, lobar stenosis, and extensive bronchiectasis. Prior to operation the remainder were thought to be purely elective resections (that is lobectomy was elected instead of thoracoplasty) but in approximately three-fourths of these the surgical specimens showed combinations of thick-walled cavities, bronchiectasis, extensive intrapulmonary ulcerative tuberculous bronchitis, fibrosis, and lobar distortion. Rubin stresses that these conditions definitely militate against a successful thoracoplasty.

There still remains a group of patients in whom thoracoplasty is highly successful. In most instances, this group forms by far the largest percentage of any thoracoplasty series. These are the patients with fibro-caseous tuberculosis, characterized by predominantly productive stable lesions associated with small or medium sized cavities. In cases of this sort, thoracoplasty will afford a high percentage of cures.

It must likewise be emphasized that the overall mortality in resection is appreciably greater than it is in thoracoplasty. In selected groups, however, particularly in those where resection is an elective procedure, the differences in mortality rates are greatly diminished.

#### CONCLUSIONS

I have indicated to you some of my thoughts regarding the present indications for resection. It is a more complicated business than it was fifteen years ago when, if major surgery was considered, thoracoplasty was almost the universal choice. I emphasize that even now in many clinics thoracoplasty would be preferred to resection for many of the patients on whom I and others have performed lobectomy and pneumonectomy. I emphasize, too, that thoracoplasty probably would be successful in a fairly large

percent but at the expense of many more operations and, perhaps, an increased sacrifice of pulmonary function.

Further study of the essential pathology for which we operate is the crux of the matter. In the future I venture to predict that the percentage of patients for resection will increase while the percentage of patients for thoracoplasty will show a gradual decline.

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### CHLOROMA (A CASE REPORT)

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ERNESTO CONTRERAS  
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We believe that it is of general interest to present this clinical case whose study has been possible to perform in due form, because of its rarity and also its typical manifestations. For this reason we reduce this paper to its simplest form restricting it to the purpose of this meeting.

This case is of particular importance from the standpoint of the differential diagnoses of exophthalmos in childhood, and since it is often a special problem of the ophthalmologist we shall describe it in detail.

#### CASE REPORT

Name—R. R.  
Age—Two years  
Sex—Female  
Place of birth—San Pedro, Sonora  
Weight—21.12 pounds.  
Height—30 inches

#### PRESENT HISTORY

This child was first seen in our ophthalmological clinic last August. The parents of this child first noticed slight exophthalmos of the left eye, which had been getting worse day by day. After one month of these symptoms a progressive swelling appeared on both temporal regions. Last September the child was operated upon in Navojoa. Three upper teeth extractions were performed with possible curettage

of the maxillar sinus. Penicillin and streptomycin were then injected.

#### PAST HISTORY

The child was born normal with no pathological data at all.

#### PHYSICAL EXAMINATION

A very under-nourished child, with slight greenish palor. The skin is dry with very little elasticity. Temperature, normal. Upon examination, the child offers no resistance, being completely indifferent to his surroundings. Physical examination shows a great exophthalmus and chemosis of the left bulbar conjunctiva that protudes over the left eyelid. The eyelashes are covered with mucopurulent secretion. There is a ptosis of the upper lid. The eye appears to be pushed upwards. The conjunctiva is slightly-pale and the cornea has some changes in its transparency. There is slight anisocoria due to midriasis of the left eye where the photomotor reflex is slow. In the right upper eyelid there is a tumor mass, whose consistence is very hard (bone?) which appears to be continuous with the bones of the orbit. In the lower right eyelid there is another but smaller tumor similar to the one described above. All around the eye the color of the skin is slightly violet with increased vascularization.

Hypertelorism—(interpupillary measurement) 80 mms.



The tarsal and bulbar conjunctiva of the right eye is extremely pale with red hemorrhagic spots.

The fundus examination shows the optic disk to be of normal form and size but pale in color, and its borders are blurred and indistinct, specially in the left eye which is also edematous. The retinal vessels are enlarged and tortuous. His face has a frog-like appearance and upon touching all these growths they have a bone-like hardness. The root of the nose appears to be caved in. The mouth is constantly open. The lips are pale and the two upper left molars are gone, also the second upper right molar. The head is normal in size and the bones of the skull appear to be separated. There is also another growth in the left submaxillary region. This tumor also appears to be very hard, not painful and apparently is a part of the maxillar bone. This growth has the size of a nut, and has increased accessory vascularization. All the nodes of the carotid and submaxillary regions are palpable. The chest is normal. The abdomen is enlarged with an umbilical hernia. The liver is enlarged 4 cms. below costal border, not painful. There is slight pre-tibial and maleolar edema. Both the inguinal and axillary nodes are palpable. The child appears slightly sub-normal in intelligence.

The X-ray (Waters' position) show the existence of large condensations in both orbits, especially in the left side giving the aspect of bony growths. In the A.P. film the skull union

sutures are quite separated with increased osseous condensation in the fronto-parietal-temporal regions. In the left lateral film the separation of the skull sutures mentioned above are more noticeable.

#### LABORATORY FINDINGS

Kahn-Kline—Negative

Blood type—"O"—Rh. Negative

T.B. test—1x1000—Negative.

Blood cell count—

Red cell—950,000—Hemoglobin—4.30 grms.

White cells—413,000—Basophiles—0—Eosinophiles—0

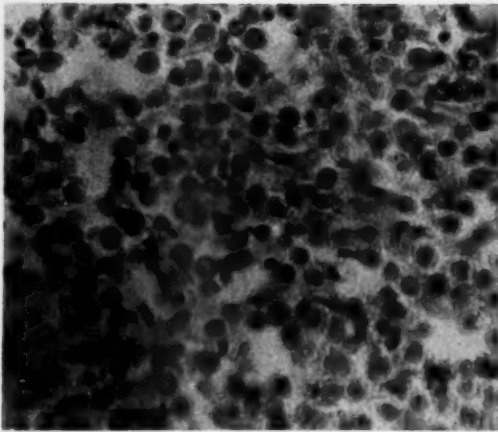
Undifferentiated forms—Monocytic series—59

Juveniles—2 Segmented—2 Lymphocytes—26

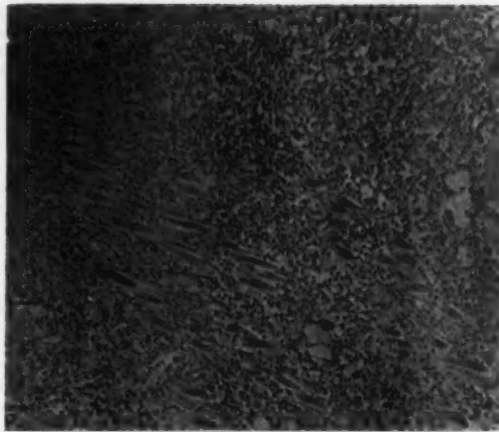
Monocytes—10

Auer's bodies in the undifferentiated series.

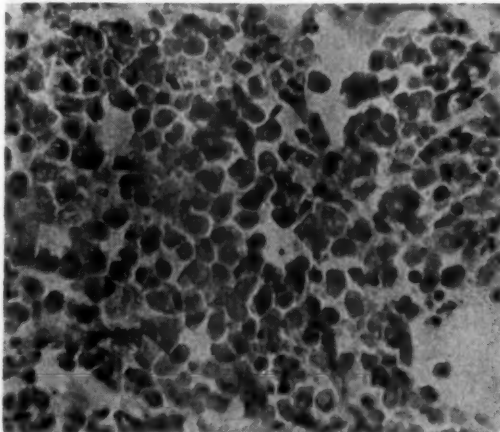
**PATHOLOGY**—A Lymph node was taken from the neck on October 16. It was a moderately enlarged node, slightly hard; the cut surface showed a uniform gray-yellowish tissue, somewhat congested. The specimen was fixed in Bouin's fluid and frozen sections were made. Microscopically the sections showed a complete loss of the normal architecture and only a few lymphocytes could be seen; the rest of the section was formed by sheets of free round cells, larger than lymphocytes, with vesicular, oval or kidney-shaped nuclei containing one to three nucleoli. Typical and atypical mitosis were frequent. These findings were thought to be consistent with leukemia or reticulum cell sarcoma.



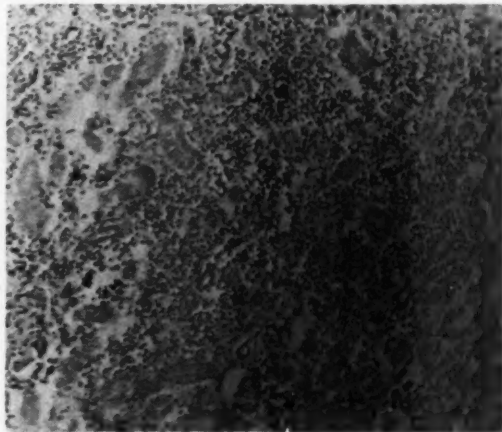
Section of Lymph Node.—Most of the cells are very young leucocytes with vesicular nucleus and several nucleoli. There are some normoblasts.



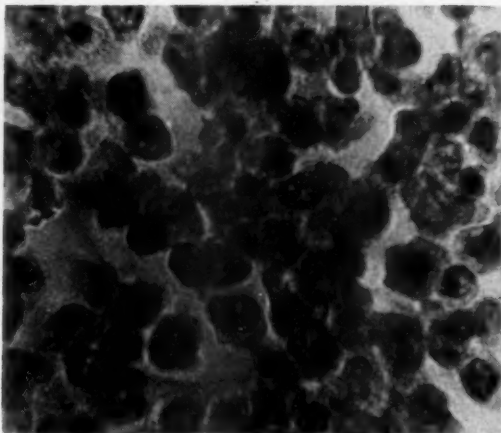
Section of the Temporal Mass.—There are some muscular fibers scattered among the Tumor cells.



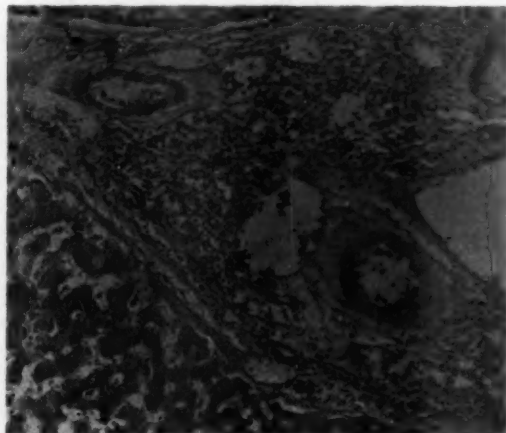
High power of the Tumor in post mortem material.—Most of the cells are blast blood cells; there are small foci of erythropoiesis.



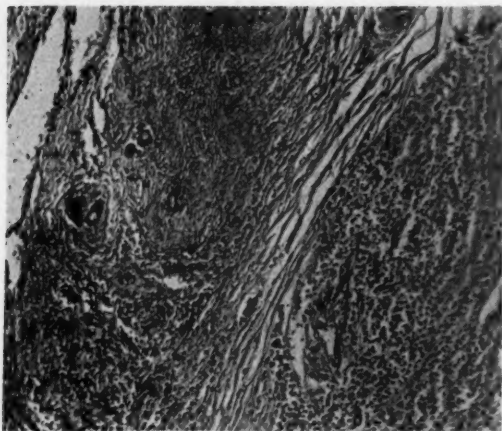
Infiltration by Tumor cells in the Cortex of the Kidney.



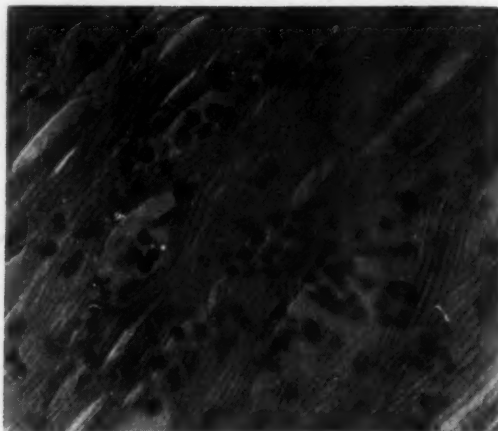
High power (immersion) of the Tumor cells.—There is a mitotic figure in one of them.



Section of the Liver.—The portal space shows a dense infiltrate by Leukemia cells. The sinusoids are moderately dilated and the Kupfer cells are conspicuous.



**Section of the Right Lung.**—The left side shows a tuberculous area with caseation and Leishman-Donovan cells: The right side is a hilar region infiltrated by Leukemia cells.



**Infiltration by Tumor cells in the Myocardium.**

Studies in the peripheral blood disclosed an extreme anemia (950,000 R.B.C.) and a very high white count (413,000) with 59% of blast forms, many of them containing Auer's bodies.

A specimen taken from the sternum gave a scanty grayish material which stained by Wright's method, showed also a very high percentage of blast undifferentiated cells (hemocytoblasts).

The patient died on November 2, and a complete autopsy was performed. There was extreme anemia in all the organs. The tumor masses of the orbit and temporal regions, on cut sections, showed a firm, bright-green tissue one to three cm. thick. Invasion by this tumoral tissue was found in the following organs and regions; tonsils and pharynx, cervical and mesenteric lymph nodes, both lungs in the form of miliary nodules or green patches in the hilar regions, both kidneys had extensive greenish cortical and medullary areas, the liver did not have limited green periportal areas; all along the anterior aspect of the vertebral bodies, the costovertebral junctions, and the internal aspect of the ribs; this invasion was a uniform one to three mm. continuous layer; however, several actual nodules were seen; in the dura mater as flat nodules; one of them located over the Torcular herophili obstructing partially the venous circulation; finally, the same green tissue was found all along the separated cranial sutures.

Contrary to what all the text books say, the bright "jade" green color of the tumor did not

fade on contact with the air or in the fixative (formaline). Ten days later, the color was as bright as in the first day.

Other findings were petechial hemorrhages in both lungs and the myocardium, and a semicalcified subpleural nodule in the right lung, with it corresponding hilar node, moderately enlarged.

Microscopically, the tumor tissue from the temporal masses, shows a dense infiltrate of free round cells in an abundant adult stroma.

Under high power, there is a mixed infiltrate which recalls that of "Mycosis fungoides"; however, the predominant type of cell is a very immature blood cell; there are also numerous foci of erythropoiesis. The infiltrate of the several viscera, is identical in all sites. The tonsils and the spleen show all the medullary spaces and sinuses filled by blast cells without forming real nodules. The bone marrow is very poor and the normal blood forming tissue is almost lost. The pulmonary node and the hilar lymph node show typical tubercles and caseation.

**SUMMARY**—A characteristic histological picture of leukemia is found in this study. Although upon the surgical biopsy specimen and the peripheral blood picture it was thought to be a monocytic type of leukemia, in the postmortem material this could not be supported and the final impression is that it is a case of acute leukemia, undifferentiated. A typical "chloroma" syndrome developed associated with leukemia. A primary tuberculous lesion was developing in the right lung.

## TREATMENT OF BURSITIS WITH INTRAVENOUS IRON CACODYLATE

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Bursitis is an inflammation of those serious-lined compartments placed here and there throughout the body where friction between the overlying soft parts and closely related firm parts is most apt to be extreme. Therefore, bursitis is a broad term covering a large number of painful and disabling situations. It arises frequently in general practice and may well form a significant part of the practice of the rheumatologist.

Its recognition may be quite simple. On the other hand, ileopectineal bursitis for example may present a definite problem from the diagnostic standpoint. Its possibility must always be kept prominent in the differential diagnosis in disturbances in the regions of joints and in areas of pain and tenderness far removed from the articular structures.

The diagnosis of bursitis is based on:

1. Pain, usually severe and agonizing in the region of the joint. The patient often volunteers that the pain seems more in the muscle than in the joint.

2. Radiation of the pain, often simulates that of neuritis. When the subdeltoid is involved the pain may radiate into the neck, arm, insertion of the deltoid, forearm and even to the finger tips.

3. The limitation of motion may be marked, due to the pain. The pain is extreme in acute cases with the slightest attempt at motion.

4. Tenderness over the involved area such as the sacro-iliac joint; or in the case of a subdeltoid bursitis, in the region of the greater tuberosity of the humerus just below the acromial process (and at times over the entire shoulder). The coracoid process and bicipital groove may also be sensitive to pressure. Often the point of greatest tenderness is over the deltoid insertion.

5. A mass or swelling may be present. In the peripheral joints especially the knee or elbow the bursal effusion may be tremendous. In the case of a subdeltoid bursitis a mass may be palpable over the deltoid insertion and this is usually the point of maximum tenderness.

6. Local heat may be present.

7. Roentgenograms may demonstrate calcium deposition in the involved bursa or tendons.

8. Usually a single bursa is involved, although not infrequently a bilateral subdeltoid bursitis is encountered.

9. A history of trauma, sometimes seemingly extremely mild, or exposure to cold or drafts may often be elicited.

When it is known, according to Comroe (1) that the approximate frequency of causes of a painful shoulder is a subdeltoid or subacromial bursitis in at least 80 per cent of all cases, one seems justified in treating this painful joint as a bursitis, until proven otherwise. If there is the slightest suspicion of a painful joint being due to bursitis, it is our policy to institute treatment immediately for bursitis.

Bursae are extremely numerous throughout the body. Indeed Virchow (2) claimed to have dissected in the neighborhood of 70 in the region of the knee joint. The number of bursae about the body is inconstant. They are formed whenever a need for them arises in response to chronic irritation of a sliding or rubbing motion. The connective tissue (3) apparently has the ability to undergo change under adequate stimulation to form the endothelial type of lining of the bursae.

The economic importance of bursitis is not inconsiderable. The baseball pitcher who develops a "glass arm" may have to leave a remunerative occupation and confine his activities to one which puts less strain on the rotators of the shoulder. The stenographer may have to be off work for a long period of time until abduction of the arm can be maintained without pain. The end result of a chronic subdeltoid bursitis—the "frozen shoulder" is only too well known and one can conceive without difficulty the economic liability of such a member. Successful treatment of bursitis, then, becomes important. It is important primarily from the standpoint of relief of an intense or nagging pain and restoration of normal function. It may be a factor in the patient's personal economy, since many of these disabilities arise as a result of an occupation.

The methods of treatment of bursitis are several, regardless of the stage of the disease. The

choice of treatment usually depends upon the stage of the bursitis, the facilities at hand, and the training or specialty of the physician. It seems in order to place here the statement on treatment made by the committee of the American Rheumatism Association in its Primer on Rheumatic Diseases published in the Journal of the A.M.A. last year:

"Treatment (of bursitis) (4) should be directed to relieving the pain, maintaining function and reassuring the patient as to the relatively mild nature of the disease. Local application of radiant heat or diathermy may relieve, but often aggravates the pain, in which case cold usually relieves. Rest during the more acute phase followed by graded exercises to restore motion is helpful. Withdrawal of exudate from a distended burse promptly relieves. Local roentgen therapy helps in some cases, especially in the subacute stage. Local procain infiltration of brachial plexus or superior cervical ganglion block will usually give temporary relief, which in addition to providing analgesia will allow exercises to maintain motion of the affected shoulder. If calcification is firm and adhesions restrict motion, excision of the calcific mass and liberation of the shoulder may be required.

"With proper care promptly provided, acute bursitis can usually be arrested or controlled. If it becomes chronic, periarticular fibrositis may result and enhance the shoulder disability. If stiffness of the shoulders persists, muscles atrophy and motion becomes so limited that a "frozen shoulder" may result. Careful manipulation with the patient under anesthesia may be required to regain motion."

It is not the purpose of this paper to enter upon a critical discussion of the merits of the multiple puncture, through-and-through irrigation, novocaine injection, the various modalities of physical therapy, of x-ray, or surgical excision. Rather it is an attempt to re-emphasize the value of the cacodylates, and specifically, iron cacodylate, in the treatment of the non-specific type of bursitis and to re-enter this drug into the therapeutic battery of the physician as practical, inexpensive, available and satisfactory.

Pharmacology: To date, it must be stated that iron cacodylate is used empirically. Satisfactory pharmacologic evidence as to its mode of action is lacking.

The cacodylates are one of the group of organic pentavalent compounds of arsenic. They

are reported (5) to slowly liberate inorganic arsenic into the body. The action on tissue cells is considered likely to be (6) that arsenic compounds may react with the sulfhydryl (SH) grouping in cells and in this way interfere with cellular oxidation. Dustin (7) in 1930 has shown that sodium cacodylate can arrest mitosis and produce nuclear abnormalities. Arsenic (8) also inhibits cellular enzymes, as for example nuclease and phosphatase. About one third of a single dose of sodium cacodylate is eliminated in 24 hours, and traces (9) may appear for as long as 4 weeks.

It should be stated here that from our experience in giving several thousand injections, no symptoms or physical signs of toxicity have occurred with the exception of nausea in occasional patients. This has been borne out in the experience of others who have used this agent in the treatment of the condition in question.

Apparently, the earliest published report of the use of iron cacodylate in the treatment of bursitis is that of T. K. Richards in the New England Journal of Medicine in 1931 (10). Dr. Richards was treating a chemist for boils by injections of iron cacodylate. The chemist had a "mildly inflamed subacromial bursa" and began to report that the shoulder improved with each injection. This observation led to trial on other patients with equally good effect, with the result that he published his experience in a small series of cases treated by this method.

A surgeon, Dr. Thew Wright, Emeritus Professor of Surgery of the University of Buffalo School of Medicine, treated a substantial number of cases of bursitis with iron cacodylate satisfactorily and introduced the method to one of us. (C. E. B.) It has been used by us for over a period of some ten years.

The only other published report which has been found is that of Dr. Louis Pelner which appeared in Industrial Medicine in 1944 (11). In this report, a series of 75 cases were treated and it was the author's statement that "the results were invariably good when the condition was present for several days to several weeks." So impressed was Dr. Pelner, that he felt the drug might be used as a diagnostic measure. He attempted to explore the mode of action and found that addition of iron cacodylate to whole blood inhibited or prevented clot retraction, whereas another iron salt produced no inhibition and sodium cacodylate produced

much less inhibition of clot retraction. He concluded that the essential mode of action of iron cacodylate was unknown but that it appeared to be due to a physico-chemical change in the blood.

It has been our practice to use iron cacodylate alone usually, (except for appropriate exercises) or in conjunction with some form of physical therapy.

The preparation of iron cacodylate used is a 3% aqueous solution. Five cubic centimeters are administered slowly by intravenous injection. It is usually given daily until there is a favorable response, then every other day. The total number of injections varies with the response of the individual patient.

In the analysis of 100 attacks of bursitis, there was a distribution of 37 males and 63 females. This report includes two or more attacks in the same individuals in 13 patients, (7 females and 6 males), a total of 35 attacks. The youngest patient was a 19 year old female, and the oldest patients were an 84 year old female and an 84 year old male. Both suffered an acute attack of bursitis of the knee. Most of all these 100 attacks of bursitis were associated with a definite history of trauma (sometimes what seemed very minor) or exposure to cold. This latter was especially true of the bursitis involving the shoulder. In the Spring and Fall, with warm days and cool nights, we found several cases occurring in men who slept without pajama tops; the shoulder being exposed to the cold air during heavy sleep. We have come to expect several attacks of bursitis of the shoulder each Spring and Fall. The left shoulder seems more prone to attacks, possibly because this shoulder is exposed to drafts in driving with the car window open.

The average age of the patients was 49.5 years. There seemed no age which seemed immune to attacks of bursitis. While the preponderance of our cases were in females, this series is too small to be of significance. We did gain the impression that some people seemed to be more susceptible to recurring attacks, but for this we were unable to account for any common factor.

This was the initial attack in 57 cases, some of these reported cases have been under observation for five years and have developed subsequent attacks varying from one to three.

The shoulder was involved in 51 cases, various other joints in decreasing frequency were

sacro-iliac, knee, elbow, wrist, etc.

The average number of treatments necessary were 9.2. The average number of treatments necessary for relief were 2.8. By relief is meant that the patient was made to resume his normal occupation without resorting to medication for pain of any type. At the end of the treatment, 80 patient or 80% were reported as well. By this is meant that the patient had been entirely free of pain for at least 72 hours and had no resulting limitation of motion. Patients were classified as improved even if they only had an occasional twinge of pain or any limitation of motion, even though the motion may have improved to a marked degree. There were 19 cases or 19% which showed improvement. This group includes 4 patients who received five to eight injections but discontinued treatment usually because of leaving town. There was one failure; a female who received six injections and showed no improvement and refused further treatment. We have one other case we consider a definite failure with iron cacodylate. This patient was not reported in this series because he was not one of the last 100 cases. This man was sent to Tucson from Detroit with the supposed diagnosis of rheumatoid arthritis of some four to six months duration but he had a very definite subdeltoid bursitis. He received 12 injections with only very minor relief and subsequently cleared entirely after x-ray therapy.

The patients were grouped according to the time elapsing between onset of symptoms and the start of treatment as follows:

1st: One to three days. These patients were usually in excruciating pain and therefore they sought help early. They required an average of 6.6 injections for complete recovery, with an average of 2.6 injections for relief. There were 28 patients in this group with 25 complete recoveries. Of the three patients reported as improved, one received seven injections, and another only four injections.

2nd: Patients who waited four to seven days required an average of 9.2 injections for complete recovery with 3.4 injections for relief. There were 20 patients in this group, 18 showing complete recovery, and two as improved. Again one of the improved left town after the 4th injection.

3rd: Patients who first sought help eight to thirty days after onset of their symptoms required an average of 9.6 injections for recovery.

There were 19 patients in this group, 17 recovered completely, one showed improvement, and there was one failure (the patient reported above who after receiving six injections refused further treatment).

4th: Those who had their disability from thirty-one days to a year required 11.6 injections and in this last group the percentage of complete recovery was only 63% with the remainder showing only improvement varying from marked to moderate whereas the group seeking relief in the first three days showed a percentage of 89.3% who recovered entirely.

This would tend to point out the fact that the earlier treatment is instituted the higher the percentage of complete relief is encountered and the fewer injections is required. Some of the patients in this group classified as improved received only four or five injections but were classified only as improved since when they were last seen they were not 100% recovered.

In selecting the following case reports, those cases which had no treatment except for intravenous injections of iron cacodylate are reported.

Mrs. R. B. W., aged 46 years was first seen June 2, 1944, complaining of pain in the left shoulder of two days duration. The pain was steady, with sharp pain on attempting motion, seeming to "run way down to the wrist". The patient carried her arm in a sling. She had applied heat with slight relief but did not get much sleep. Examination showed no fever. There was marked tenderness over the tip of the left shoulder and over the entire deltoid area. The slightest attempt at motion in the shoulder especially abduction or rotation, caused excruciating pain. She was given five cc. of a three per cent solution of iron cacodylate intravenously. The following day she was able to drive her own car to the clinic. Thereafter she was given three more injections on alternate days. On the third visit she volunteered that she was very much improved. On her last visit, she was free of pain but never the less was given her fifth injection of iron cacodylate. On attempting to find a cause of this attack, the patient was asked if she had been exposed to any drafts. She stated she had sat in the breeze of a window cooler reading a book. Two years later she was again seen complaining of pain in the left shoulder which she had first noticed the preceding day on leaving an air conditioned movie. She was given three injections of iron

cacodylate on three successive days with complete relief. She returned 14 days later stating she now had bursitis in her right shoulder although the pain was not as severe as with her previous attacks. She again was given four injections of iron cacodylate on successive days. On her fourth visit she stated she had had no pain for 24 hours and the morning of her last visit she had done the family washing before coming to the clinic for her injection. She has had no subsequent attacks during the past four years.

Mrs. B. O. B., aged 52 years was first seen because of severe pain in the lower back. The patient stated the pain had started suddenly just after lunch the preceding day. The pain was so severe she was unable to turn over in bed without assistance, and with assistance she screamed with pain. She stated that two years previously, she had had a similar attack and was hospitalized for two weeks. Examination showed marked tenderness over the left sacroiliac joint. There was considerable muscle spasm of the lower back, more marked on the left. She was given seven injections intravenously of iron cacodylate. The second day the pain was much less acute, and the following day the patient was up and around with only an occasional twinge. She volunteered that if her car had been available she could have driven to the clinic. She came to the clinic for four subsequent injections on alternate days. On her last visit she stated she had been entirely free of pain for 48 hours. She was discharged as recovered.

Mr. R. B., an 84 year old male, was seen because of acute pain in the right knee. The previous day he had been on his hands and knees weeding his lawn and had noticed slight pain in the right knee towards evening. This became worse during the night and by the next morning it was so intense that the patient was unable to move without screaming with pain. He had his knee propped up and flexed on pillows. There was a tremendous fluctuating swelling of the right knee, with very definite increase in skin temperature. The swelling seemed due to effusion into the suprapatellar bursa. It did not seem possible that iron cacodylate could be effective in causing the absorption of this amount of fluid, and it was thought it would be necessary to aspirate the bursa. Nothing was done except for intravenous iron cacodylate on four succes-

sive days. Within 24 hours the patient was more comfortable and by the fourth day was able to walk, although he had some pain on walking. He was given six more injections on alternate days and by the tenth injection was entirely comfortable and the bursal effusion had entirely absorbed. This old gentleman lived to be 90 years of age and had no subsequent attacks.

In summary, we have reported 100 unselected cases of bursitis (acute, subacute, and chronic) which were treated with intravenous iron cadoylate and in some instances with accompanying appropriate physical therapy. Of these 100

cases, 80% were reported as recovered, 19% as improved, and 1% as a failure.

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### THE EFFECT OF CONCENTRATION OF SERA ON THE SEROLOGICAL TESTS FOR SYPHILIS

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The present day concept of syphilis serology states that there is an antibody-like substance in the blood stream (reagin) that reacts with the antigen, causing it to produce a floc, and fix complemen (1). This theory presumes that there are demonstrable antibodies in the blood stream of the syphilitic, but does not explain zone reactions in known syphilitics, nor why normal individuals will at times give positive serological tests. Furthermore, it does not offer any explanation why diseases other than syphilis will flocculate the antigen or fix complement.

Previous work by the authors (2, 3, 4) has indicated that the production of a floc by any sera was due to the divalent cations in the sera replacing the monovalent cations on the antigen and thereby flocculating the suspension. Consequently, concentration of negative sera by dialysis through a semi-permeable membrane should produce a positive test. Also, simple concentration by evaporation would not be expected to alter the seroactivity of any sample. This should be true because in the case of the dialysed sample there would be an unbalancing of the normal ionic content in the sera while in the second case the proportions remained constant. In order to study the relative effects of concentration by dialysis and evaporation the following experiments were carried out:

Blood samples as they were received by the laboratory were separated from their clot and

centrifuged for five minutes and the clear sera poured off. Standard Klines, Hinton's, and Kahns (diagnostic) were run on all sera. Only clear, unhemolyzed sera were used in these experiments. The sera were then pooled according to their reactivity, and again checked by the Kline method. Negative, two plus and four plus sera were saved until a total of 130 ml. were obtained of each reaction. These pooled sera were then divided into two 65 ml. portions, A and B.

Portion A was placed in a porcelain evaporating dish and an electric fan placed so as to blow a stream of air over the surface of the sample. In this way the sera were completely dry within 45-60 minutes at room temperature. The dry powder was carefully ground in an agate mortar, and placed in a screw-capped homeopathic vial until ready for use. This powder was dissolved in 30 ml. of distilled water, giving a solution containing a little over twice as many solids as were contained in the original 65 ml. sample of serum. Serial dilutions were then made on this suspension. Standard Klines, Hinton's, Kahns and Kolmer Wassermann's were run on each dilution. The results are given in Table I. The concentration is expressed as the percent of concentration of solids, (65 ml. being taken as 100%), since the dried sera were obtained from pooled sera of that volume. Ten samples of pooled sera were run on each reaction, (Negative, 2+ and 4+). Only the re-

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**TABLE I**  
The Effect of Serum Concentration on Sero-activity

% Serum Concen- tration*	KAHN		KLINE		HINTON		WASSERMANN	
	Neg.	2+	Neg.	2+	Neg.	Pos.	Neg.	2+
229%	Reaction	-	2+	4+	-	+	+	-
	Titre	-	1-8	1-128	-	1-8	1-128	-
162%	Reaction	-	2+	4+	-	+	+	-
	Titre	-	1-8	1-128	-	1-8	1-128	-
130%	Reaction	-	2+	4+	-	+	+	-
	Titre	-	1-8	1-128	-	1-8	1-128	-
100%	Reaction	-	2+	4+	-	+	+	-
	Titre	-	1-8	1-128	-	1-8	1-128	-
93%	Reaction	-	2+	4+	-	+	+	-
	Titre	-	1-8	1-128	-	1-8	1-128	-
81%	Reaction	-	2+	4+	-	+	+	-
	Titre	-	1-4	1-64	-	1-4	1-64	-
65%	Reaction	-	1+	4+	-	+	+	-
	Titre	-	1-2	1-64	-	1-2	1-32	-
56%	Reaction	-	-	4+	-	+	+	-
	Titre	-	-	1-32	-	1-2	1-16	-
52%	Reaction	-	-	3+	-	-	+	-
	Titre	-	-	1-32	-	-	1-16	-
50%	Reaction	-	-	3+	-	-	+	-
	Titre	-	-	1-32	-	-	1-16	-
46%	Reaction	-	-	2+	-	-	+	-
	Titre	-	-	1-4	-	-	1-4	-

sults of one representative sample from each will be given.

Portion B was concentrated by dialysis through a cellophane tube. A length of cellophane dialysing tube (1½ Meter) similar to those used in transfusion sets, was attached to a 50 ml. burette and the open end closed off by means of a pinch clamp. The sera were poured into the burette, the cellophane tube allowed to fill, and a stream of air directed against the tube. As the sera dialysed through the tube the number of milliliters loss could be determined by reading the drop on the burette.

When the sera had lost 40% by volume they were drawn out, thoroughly mixed and a 3 ml. sample removed. Sample 1—The burette and tube were washed and with double distilled water in sufficient quantity to add to the concentrated sera and make them back up to volume, and a second 3 ml. sample removed

(Sample 2). For example, for an original 100 ml. sample concentrated to 60 ml. 40 ml. of double distilled water was run through the burette into the 60 ml. of concentrate. In this way the volume of sample was the same as the original control sample. However, the total salt concentration had decreased since the smaller ions would diffuse, or dialyse, through the permeable membrane at a more rapid rate than would the larger protein and lipoidal molecules would. Sodium and potassium would pass through the membrane much more rapidly than the larger more highly charged calcium molecule. After sample 2 was removed the cellophane dialysing tube was placed in the sera and thoroughly shaken in order to dissolve any ions that had dialysed through the tube. Another sample was then removed (sample 3). The last step was performed with the thought that the dialysed salts when added back to the sample (sample

**TABLE II**  
Effect of Concentration by Dialysis on Sero-Activity

	KAHN			KLINKE			HINTON			WASSERMANN		
Control Sample Titre	Neg. -	2+ 1-8	4+ 1-128	Neg. -	2+ 1-8	4+ 1-128	Neg. -	2+ 1-8	4+ 1-128	Neg. -	2+ 1-8	4+ 1-128
Concentrated to 60% of volume Titre (1)	4+ 1-256	4+ 1-512	4+ 1-1024	4+ 1-256	4+ 1-512	4+ 1-1024	Pos. 1-256	Pos. 1-272	Pos. 1-1024	3+ 1-64	4+ 1-512	4+ 1-1024
Made up to original volume with dis- tilled water Titre (2)	3+ 1-128	4+ 1-256	4+ 1-512	3+ 1-256	4+ 1-256	4+ 1-512	Pos. 1-256	Pos. 1-256	Pos. 1-512	2+ 1-16	4+ 1-128	4+ 1-256
Cellophane tube added Titre (3)	Neg. -	2+ 1-8	4+ 1-128	Neg. -	2+ 1-8	4+ 1-128	Neg. -	Pos. 1-8	Pos. 1-128	Neg. -	2+ 1-8	4+ 1-128

2) should neutralize or offset the effect of concentration and dialyses. All three samples were heated at 56°C. for 30 minutes and examined by the same four tests as given above. The results are given in Table II. Ten samples were run at each concentration (Negative, 2+, and 4+), but only one representative sample of each are given in the table.

#### DISCUSSION

If we are to accept the present day concept of an antibody like substance in the blood stream of syphilitics (reagin) it would necessarily follow that simple concentration of the total solids dissolved matter in the sera would result in the production of a positive test. If, however, we assume that the reactivity of any given sera is due to the preponderance of one normal constituent over another ( $\text{Ca}^{++}:\text{Na}^{+}$ )—that is, an upset ionic ratio—mere concentration of serum solids would not effect the sero-activity. Table I demonstrates this point very clearly. Even when a given sera contained over twice the normal solids (239%) the reactivity was not altered.

Likewise, if the reactive substance is a large molecule, (lipoid,) as it is presumed to be, we would expect to increase the reactivity, or titre, when the sera were concentrated by evaporation and when the concentrated sera were again made up to their original volume with distilled water it would be expected that the sample would return to its normal control reaction. We failed to obtain these results in our experiments. If, however, the reactivity were due to an upset in the ionic balance in the sera we would expect that (a) on concentration by dialysis or diffusion, any sera should become

more strongly sero-active, (b) that when these sera were made up to volume with distilled water little or no change should take place in their titre, and (c) that if the tube used for dialysis were washed with the diluted sera that that dialysed material should go back into solution and restore the sample to the control reaction. This point was illustrated in Table II.

From the data presented in this paper it would appear that the active ingredients in any sero-active serum is some normal constituent that has become dominant due to an actual increase of that element or the decrease in some other portion. Previous work in this laboratory has indicated that the divalent cations of  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  (lit. cit.) are responsible for the production of the floc in the various tests. When sera are concentrated by evaporation the monovalent: divalent ratio is not disturbed, even though there is an increased per unit volume, therefore there is no appreciable increase of  $\text{Ca}^{++}$  over  $\text{Na}^{+}$ ; on the other hand  $\text{Na}^{+}$  will pass through a semi-permeable membrane much more rapidly than will the larger, more highly charged  $\text{Ca}^{++}$ , thereby upsetting the normal balance in the sera. With the relative increase of the  $\text{Ca}^{++}$  there will be more divalent cations to react with the zeolite-like indicator, replacing the  $\text{Na}^{+}$  on the molecule and thereby forming a floc and a positive test. When the dialysed sera were made up to volume with distilled water the  $\text{Na}^{+}:\text{Ca}^{++}$  ratios were not changed, therefore, what little effect there was noted was due to a dilution factor. The addition of the dialysing tube, however, replaced the lost ions of Na and restored the normal  $\text{Na}^{+}:\text{Ca}^{++}$  balance for that sample and thereby returning the serum to its normal reaction.

### CONCLUSION

1. Concentration of sera by evaporation will not alter the sero-activity of that specimen.
2. Dialysis of a serum through a semi-permeable membrane will result in a positive reaction to the various tests.
3. Dialysed sera when made up to volume with distilled water do not return to their normal titre.
4. The addition of the dialysed material by washing the dialysing tube in the diluted sera

results in a decrease in titre and return to its control reaction.

5. The results indicate that the ionic balance, probably Ca:Na, is responsible for the reactivity of any given serum.

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## BASIC SCIENCE SEMINAR

### DRUGS AFFECTING THE AUTONOMIC NERVOUS SYSTEM

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#### INTRODUCTION

A subject of considerable recent medical interest, both in the laboratory and clinically, is the actions and uses of various groups of drugs affecting the autonomic nervous system. For a discussion of these drugs it is necessary first to consider briefly the structure, function and nomenclature of this nervous system.

All structures of the body aside from the skeletal muscles are supplied by fibers of the autonomic nervous system, both efferent and afferent. The main characteristic of these structures, and that responsible for the name of the system, is that of automatic action following nerve section. The afferent fibers are quite similar to sensory somatic fibers, both in structure and in reaction to drugs. The efferent fibers are divided into the two main categories of sympathetic and para-sympathetic, usually with contrasting functions.

The fibers of both structures have one ganglia only between their issuance from the central nervous system and their termination in the end-organ. The sympathetic system has ganglia in three sites, vertebral; pre-vertebral; and terminal. The para-sympathetic usually has only terminal ganglia. In the sympathetic system the single synapse may occur in any of the ganglia

mentioned, and need not correspond to the level of chord origin. The sympathetic ganglionic fibers synapse with many post-ganglionic ones, the ratio sometimes being as high as 1:20. In contrast the fibers of the para-sympathetic system synapse in a much lower ratio, frequently being 1:1. Thus the sympathetic system tends to discharge as a unit while the discharge of the para-sympathetic is apt to be localized and selective.

Transmission of impulses is accomplished in effector organs by chemical mediation. It has been postulated that the type of reaction occurring (stimulation or inhibition) will depend on a substance in the organ. This is thought to combine with the chemical liberated at the nerve ending, which is acetyl-choline in the case of the para-sympathetic system and sympathin in nerves of sympathetic origin. Both substances are broken down by enzymes, cholinesterase and amine oxidase respectively. The action is very rapid with cholinesterase, but considerably slower in the case of amine oxidase, a point of clinical significance.

Transmission in ganglia is also accomplished by chemical mediators. On stimulation of pre-ganglionic nerves acetyl-choline is the chemical mediator in both sympathetic and para-sympathetic ganglia. The cells of the adrenal medulla are activated by pre-ganglionic sympathetic fibers, this anomaly being explained by the fact

that the cells are modified neuroblasts and homologous with sympathetic ganglion cells. Thus we have the phenomenon of acetylcholine being the mediator of nerve impulses causing the release of epinephrine. Acetylcholine has two somewhat diverse actions, the so called muscarinic and nicotinic effects. The action usually attributed to acetylcholine (i. e. the transmission of impulses to effector organs) is the one classified as muscarinic, while the property of transmission of impulses at the ganglia (and stimulation of ganglia) is the nicotinic effect. This distinction is of importance when considering certain of the drugs affecting the cholinergic system.

For the purposes of this paper it would be advantageous to classify the portions of the autonomic nervous system on the basis of the chemical used as the transmitter of the nerve impulse. Using this as a guide we have all nerves classified under two headings—(1) cholinergic and—(2) adrenergic. The former includes not only all post-ganglionic parasympathetic fibers, but also all autonomic preganglionic nerves, whether sympathetic or para-sympathetic. In addition it includes the splanchnic nerves to the adrenal medulla. The latter includes those nerves which act through release of an epinephrine-like substance (adrenalin; sympathin). Thus these consist only of post-ganglionic fibers of the sympathetic nervous system.

The autonomic drugs act on cells and chemicals but not on nerve endings. The following is a sequence of events in the propagation of a nerve impulse. (1) Preganglionic nerve impulse—(2) Liberation of chemical mediator (acetylcholine)—in ganglia—(3) Post ganglionic impulse—(4) Liberation of chemical mediator at end-organ—(5) combination of mediator with receptive substance—(6) Specific Response of organ. Some drugs act at step number four, others at six, and still others facilitate step five. Drugs are much more effective on organs which have had their nerve supply interrupted. This is particularly noticeable in end-organs of adrenergic nerves. One clinical application of this is the well known fact that sympathectomies should be pre-ganglionic in location.

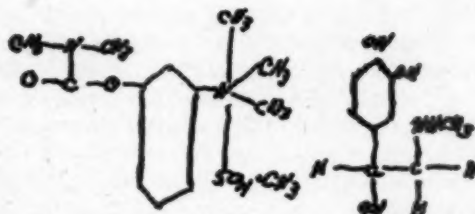
### CHOLINERGIC DRUGS

#### A—Stimulatory

In this group we shall consider both those drugs having stimulatory and those having in-

hibitory effects on the cholinergic system. Among the former are Acetyl-B-Methylcholine, physostigmine, prostigmine, and pilocarpine.

*Acetyl-B-Methylcholine (mecholyl)* and *Carbaminoylcholine* were synthesized in an attempt to procure a drug having the properties of acetylcholine plus a degree of stability sufficient for clinical use. An additional property secured in these compounds was a lack of nicotinic effect. These drugs have various actions which would be expected to prove useful clinically, but which are in reality only rarely used. The most outstanding of these is that of contracture of the detrussor muscles of the urinary bladder. This action can be utilized in cases of chord bladders and in post-surgical urinary retention (dosage 20 mg hypo). Mecholyl has also found use in the treatment of paroxysmal auricular tachycardia, having been reported successful in 90% of cases (dosage 15-40 mg hyp). It is to be noted that this drug will not be effective in patients receiving quinidine. Still another field of usefulness is in lowering the blood pressure of essential hypertensives, (10 mg hypo) although this is not feasible for long management. Undesirable side actions consist of production of bronchial asthma in those susceptible, and occurrence of auricular fibrillation in hyperthyroid patients.



### PHYSOSTIGMINE—PROSTIGMINE

*Physostigmine* and *Prostigmine* will be considered together, since they both contain the basic chemical structure for anti-cholinesterase activity, (methylester group), and have similar actions. Their mode of action is by inhibition of cholinesterase, thus allowing a longer duration of action of acetylcholine at the nerve junction. This leads at times to bizarre effects, as these drugs thus act on sympathetic ganglia as well as on terminal para-sympathetic nerves, the total result depending on

the summation of effects. Both drugs act on the gastro-intestinal tract, increasing its tone and motility with resultant belching and defecation. This action finds use in the treatment of post-operative ileus, prostigmine being the drug of choice (0.25 mg hypo prophylactically and 0.5 to 1.0 mg therapeutically.) There is a similar increase in tonus of the urinary bladder (same dosage) which might prove of use in post-operative incontinence, and also in cases of tabes dorsalis. Physostigmine finds wide usage in the treatment of glaucoma because of the extreme miosis it produces, lasting from 24-48 hours, with resultant fall in intra-ocular pressure. Both drugs are of use in cases of myasthenia gravis, prostigmine, being the drug of choice because of the relative absence of miosis.

*Pilocarpine*, although producing somewhat the same results as physostigmine and prostigmine, acts by an entirely different manner. The site of action is the end organ itself, and action is independent of intactness of the nerve. All of the muscarinic, and none of the nicotinic effects of acetyl-choline are present. Its maximum effect is on sweat and salivary glands. Doses of 10 to 15 mg cause marked diaphoresis, sometimes amounting to 2 or 3 liters. This fluid will contain as much as eight grams of nitrogen in patients with an elevated non-protein nitrogen, but the danger of circulatory collapse is too great to permit this to be used as a form of therapy. This drug has been advocated in the therapy of atropine poisoning, but it does not combat the severe central manifestations of this condition. Its sole practical clinical use appears to be as a miotic, in which it is used in a 0.5 to 3.0% solution.

#### *B—Inhibitory*

Those drugs having an inhibitory action on the cholinergic system are atropine, scopolamine and trasentin. There are other members of the group, but these may be considered representative and of maximum clinical usefulness. The naturally occurring members of the group are a combination of an aromatic acid and complex organic bases.

*Atropine* and *Scopolamine* have both a central and peripheral field of action, atropine acting mainly in the latter and scopolamine in the former. Peripheral action occurs exclusively at the end-organ, there thus being no effect on the autonomic ganglia. The locus of action cen-

trally is unknown. The drugs are eliminated by hydrolysis and by kidney excretion.

The main structures affected are glands and smooth muscle, with inhibition of both. The effects on the salivary and sweat glands are particularly marked but of little clinical use. The main uses of atropine are to lessen motility and spasm of the gastro-intestinal tract, and as a mydriatic in cases of iritis. It is also of use pre-operatively to lessen the quantity of bronchial secretions. It is however of doubtful value in cases of colic, biliary or ureteral, and there is no appreciable action on gastric or pancreatic glands.

Scopolamine is primarily a central depressant. However, in large doses, or in individuals suffering pain it is apt to have an excitatory effect, with marked hallucination. This sedative and tranquilizing action is useful in the treatment of alcoholism and also as an adjunct to narcosis. Both scopolamine and atropine produce a moderate stimulation of respiration. Dosage of both is 0.3 to 0.5 mg. oral or hypo.

*Trasentin* is a synthetic member of the anticholinergic family, which acts directly on smooth muscle and does not seem to have the highly selective parasympatholytic action of atropine. Because of this trasentin can counteract direct muscle stimulants more effectively. It lacks the glandular and mydriatic effects of atropine and is thus more useful in certain conditions. It has long been successfully used in the treatment of peptic ulcers (75 to 150 mg. oral t.i.d.) but recently a new field of usefulness has been reported, that of aiding cervical dilatation in the 1st stage of labor. It is effectively used in cases wherein the cervical dilatation has remained static at four to five centimeters for several hours. Dosage is 250 to 400 mg, with delivery usually occurring within thirty minutes. A complication which must be watched for is a drop in blood pressure.

The most recent addition to the ante-cholinergic field is *Banthine* (methantheline bromide), which has been used with great success in the therapy of peptic ulcer. Its mode of action is the blocking of cholinesterase at effector organs and also at autonomic ganglia. The action at effector organs resembles atropine effect, but is of much longer duration. Its potency is such that it can actually cause complete cessation of all gastric motility, as determined by fluoroscopy with barium meal. It affects other organs

than the stomach, such actions being undesirable side-actions in the therapy of peptic ulcer. Chief among these is inhibition of the detrussor muscles of the bladder with incomplete voiding and stagnation of urine. There is also minimal drying of the mouth. Dosage is 50 to 100 mg three time a day and also in the middle of the night, the last mentioned dose being the most important. Its use is being evaluated in other diseases involving hyperactivity of the sympathetic nervous system, its action here being in the autonomic ganglia.

### ADRENERGIC DRUGS

**A—Stimulatory.** Those drugs having a stimulatory effect on this system are best represented by epinephrine, and therefore we shall use this as an example of the entire group. In considering these drugs it must be remembered that stimulation of the sympathetic nervous system does not imply stimulation of all of the end organs innervated. Thus while increased sympathetic outflow results in stimulation of the myocardium it also results in inhibition of gastrointestinal motility. This must be remembered in considering the multiple actions of the adrenergic drugs.

**Epinephrine**, a hormone closely related to the amino acid tyrosine, acts directly on effector cells. Since certain structures are stimulated and others inhibited by epinephrine, it is thought that there is a specific substance in the cells which determines whether the action shall be one of stimulation or of inhibition. The duration of action is dependent upon the rate of oxidation, amine oxidase taking part in its destruction. The many actions of epinephrine are too familiar to require discussion, but a brief list of those most characteristic might be of value. There is increase in blood pressure, contraction of the splenic capsula, bronchodilatation, relaxation of the gastro-intestinal tract,

stimulation of metabolism, and myocardial stimulation. There is no evidence of tachyphylaxis on repeated administration. Its main clinical use is in alleviation of acute attacks of bronchial asthma, in treatment of severe allergic reactions, and in prolonging action of local anesthetics. It is sometimes employed to control superficial bleeding, especially from the nasal mucosa.

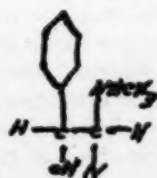
**Ephedrine** is an alkaloid, originally derived from a chinese herb. Its exact locus of action is unknown, but it has been postulated that it combines with amine oxidase, thus acting in much the same manner as physostigmine in the cholinergic system. Ephedrine is very similar to epinephrine in its actions, with certain notable exceptions. Ephedrine can be given by mouth and has a longer duration of action. It exhibits the phenomenon of tachyphylaxis, and stimulates the central nervous system. It is of benefit in myasthenia gravis and acts as a mydriatic otherwise it has somewhat the same field of usefulness as epinephrine. Its fate is unknown, but it is known that it is not destroyed by amine oxidase, and is not rapidly excreted by the kidneys.

**Neo-synephrine** is quite similar to ephedrine in chemical structure, being synthesized readily. Its actions also are similar to ephedrine with the exceptions of absence of tachyphylaxis and increased stability and duration of action. Side reactions of nervousness, tremor and headache are low. It finds its widest use in local vasoconstrictive action. It is also valuable for maintaining blood pressure in anesthesia (5 mg hypo repeated prn) and for therapy of orthostatic hypotension (25 mg oral three times each morning). It has little central stimulation.

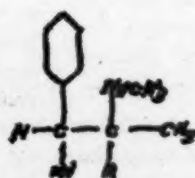
**Benzedrine** and **Dexedrine** are sympathomimetic amines very similar in structure and actions to ephedrine. However, the central actions are much more marked, forming the basis for the



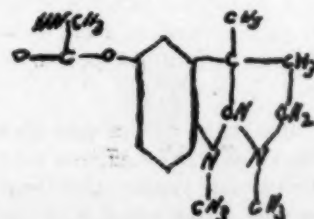
Epinephrine



Ephedrine



Benzedrine



Neo-Synephrine

clinical usefulness, while the peripheral actions are much less intense. The central actions consist of cortical stimulation, with euphoria, lessened fatigue, sleeplessness, enhanced ability to concentrate and increased motor activity. Because of these marked cerebral effects there has developed a considerable degree of habituation to this drug, especially in prisons and disciplinary barracks, where the problem has become quite serious. In these institutions the usual method of ingestion is oral administration of the contents of inhalers.

The purposes for which it is used clinically are narcolepsy, obesity, mild depression states, and sometimes in acute alcoholism, for which it is a specific antidote. In combination with amytol (dexamy) it is used to raise the pain threshold in post-operative patients.

Dosage is 10-30 mg by hypo or oral. Elimination is entirely through the kidneys, occurring only slowly, and accounting for the long duration of action.

*B-Inhibitory.* We now come to the newest and possibly the most interesting field of our topic, that of the sympatholytic drugs. These drugs inhibit sympathetic activity throughout the body, thus producing of clinically valuable effects. By some these are hailed as the latest "miracle drugs", and they may yet prove to be so. It must be stressed that these drugs are new, some of them so new as to be available at present only for experimental use. The scope of the field is rapidly widening, and will continue to do so as more is learned and newer related compounds developed.

The magnitude of this subject may be better appreciated when one considers the manifold functions of the sympathetic nervous system, and its importance in certain pathological conditions. It is of prime consideration in elevation of the blood pressure of the "essential" type, it is a controlling factor in synovial fluid reaction; it plays a part in such widely separated conditions as frostbite, poliomyelitis and phantom limb pain.

It must be remembered that there is an afferent as well as an efferent side to the sympathetic nervous system, and these drugs block this as well. This action is of use in many painful conditions, a few of which are dysmenorrhea,

causalgia, and pleuritis. Experiments are being carried forward at present to evaluate their use in relieving the pain of coronary thrombosis, and pulmonary infarction, and it has been established that they are of aid in relieving the pain of renal and gall bladder colic.

However, aside from their use in the relief of pain, their main field at present is in the treatment of vasospasm, ranging from hypertension to Burgers Disease.

There have been a number of drugs (ergot, yohimbine, dioxane derivatives) long known to possess anti-adrenergic properties, but these are all too toxic in therapeutic dosage for routine use. Therefore, prior to the advent of the group of drugs which follows, overactivity of the sympathetic nervous system could only be combated by stimulation of the para-sympathetic system or sympathectomy.

*Dibenamine* (dibenzyl beta-chloroethylamine) acts by blocking the excitatory action of epinephrine (sympathin E) and unmasking its inhibitory action (sympathin I). After therapeutic doses of dibenamine response may still be elicited by agents which act directly, such as pituitrin. Its chief use to date has been in the treatment of essential hypertension, particularly that of a malignant nature. Its use is still in the experimental stage but results have been very encouraging. It produces definite orthostatic hypotension in all subjects, and dramatically relieves the symptoms of malignant hypertension in most patients. In patients with essential hypertension the supine blood pressure level may also be adequately controlled by repeated doses. In comparison with etamon, an approximately equal drop in supine blood pressure was obtained, but a considerably longer duration of action was found with dibenamine.

Some incidental actions, which may prove to be of clinical usefulness are an increased urea clearance and increased urine volume, probably on the basis of decreased tubular resorption. Toxic reactions seem to occur in all patients, to varying degrees. They consist of nausea, restlessness and drowsiness. Dibenamine is administered by slow i.v. drip in a dosage of 2 to 10 mg. kg per day. It is possible to use oral administration in a dosage of 0.25 to 0.5 gm. one to three times daily, but the value of this method has not been evaluated.

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# **SEARLE**

RESEARCH IN THE SERVICE OF MEDICINE



WHEN WRITING ADVERTISERS PLEASE MENTION THIS JOURNAL

*Etamon* hydrochloride (tetraethylammonium chloride) acts by competing with acetylcholine, at the autonomic ganglia. It thus blocks parasympathetic as well as sympathetic ganglion transmission; however its main clinical effect is one of sympatholysis. It has been used extensively to relieve the vasospasm incident to Burger's Disease, and it has received limited trial in the treatment of causalgia. It may be used with benefit in any of the conditions mentioned in the introduction to the sympatholytics. It has given fairly good results in relief of the pain of gastric crises. Improvement has been obtained by its use in cases of anxiety reaction, the results sometimes being quite impressive. A field in which it may prove quite useful in the future is that of poliomyelitis, in the relief of pain and amelioration of contracture formation. The rationale of its use here is that pain in this disease is caused by ischemia, due to vasoconstriction due to overactive sympathetic outflow.

In general, this drug may be used as a substitute for para-vertebral block on a temporary basis, whenever this is indicated. Toxic effects include dryness of the mouth, postural hypotension, and occasional interference with urination and defecation. Dosage is 0.25 gm t.i.d. orally for ulcer pain. For all other conditions 3 to 5 cc intravenously or up to 15 cc intramuscularly per day. Patient should remain supine for  $\frac{1}{2}$  hour following injection.

*Methonium compounds* have actions very similar to those given above for *etamon*, but the duration of effect is longer. These are still undergoing experimental development. Dosage is 100 mg intramuscularly or 1 gm. oral t.i.d. They have the advantage of being absorbed in therapeutic concentrations from the intestinal tract.

*Priscol* (2-benzyl-4, 5-imidazoline hydrochloride) is an anti-adrenergic agent which has the advantage of oral administration. Its locus of action is at the end organ, where it inhibits reaction to sympathin (or epinephrine). It does not act on autonomic ganglia. It differs from other agents in this field (such as *etamon*) by causing marked increase in gastric motility, and for this reason is contraindicated in cases of peptic ulcer. The main clinical effect is that of vasodilatation, and it may be used advantageously in any condition involving vasospasm, such as Burger's and Raynaud's Diseases, peripheral vascular complications of diabetes, and

stasis ulcer. Other actions of possible clinical use include a decrease in blood sugar, both in normal and diabetic persons, particularly noticeable in elderly diabetics. Also a diuresis on intravenous injection in cases of water retention due to acute or sub-acute nephritis, and a well maintained drop in blood pressure in cases of essential hypertension.

In summary it can be stated that it is of great use as a substitute for para-vertebral block, is very useful in visceral pain due to vascular spasm, and can be given orally.

Dosage is 25 to 50 mg orally four to six times daily, or 10 to 50 mg by hypo four times daily. Side actions consist of nausea, epigastric distress or diarrhea, tachycardia, and slow rise or fall in blood pressure. These symptoms frequently disappear with continued therapy, regardless of increase in dosage.

*Dibutoline*—A useful antispasmodic

Leo J. Kent—*Arizona Medicine* 7:31; July 1950

*Dibutoline* (Dibutyl urethane of dimethyl ethyl B—hydroxy ethyl ammonium sulfate, Merck & Co. Inc) is a drug of the anti-cholinergic group which is considered here because of only recent receipt of literature. This drug is paradoxical in that it belongs to a group of chemicals (choline esters) having cholinergic properties and yet it itself has an anti-cholinergic effect. It acts by inhibiting acetylcholine at the myoneural junction, in exactly the same manner as atropine. It is claimed that it has no action on the autonomic ganglia (as does *Banthine*), and does not affect the adrenergic system. However there is a local inhibitory action on smooth muscle, which accounts for a drop in blood pressure on intravenous administration.

Its main use is in relieving cases of smooth muscle spasm of the gastro-intestinal, biliary and urinary tracts, for which purpose it has proven highly effective. It has a low toxicity, and a moderate degree of mouth dryness and pupil dilatation as side actions. Relief has been effected in cases of severe renal and biliary colic, after atropine and demerol have proven ineffective. *Dibutoline* has also been of use in cases of duodenal ulcer, pylorospasm, acute gastroenteritis, ulcerative colitis, spastic colon, and dysmenorrhea. It is very useful in post-cystoscopy spasm.

Dosage is 5 to 10 mg hypo (0.5 to 1.0 cc) repeated in thirty minutes if necessary and there-

after every three to four hours. Dibutoline is ineffective when taken orally.

This drug is not yet available for clinical use, and is still classified as a "New Drug" by the Federal Food, Drug and Cosmetic Act.

### SUMMARY

A brief review of the physiology and anatomy of the autonomic nervous system has been presented, together with a description of drugs affecting it and their clinical use. The great potential field of the sympatholytics and spasmolytics has been set forth, together with some of the recent advances in this topic. It is hoped that the information presented will be of some help, and that the possibilities suggested will stimulate further clinical trial and evaluation.

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## Relationship of Stress to Autonomic Liability

Studies in psychosomatics have shown that functional disorders often are a result of the patient's inability to adjust to emotionally stressful situations (stressor factors).

Nervous tension and chronic anxiety, discharged through a labile Autonomic Nervous System, can cause somatic disturbance.<sup>1,2</sup> Such states may involve any one of the organ systems or several at one time.<sup>1,3</sup> The outline below is designed to relate gastrointestinal and cardiovascular symptomatology to the exaggerated response of the autonomic nervous system.

	Physiologic Effects of Autonomic Discharge	
	Sympathetic	Parasympathetic
Gastro-intestinal System	Hypomotility Intestinal Atony Hyposecretion Reduced salivation	Hypermotility Gastrointestinal spasm Hypersecretion
Cardio-vascular System	Rapid heart rate Peripheral vasoconstriction	Slow heart rate Vasodilatation
Functional Manifestations	Palpitation Tachycardia Elevated blood pressure Dry mouth and throat	Heartburn Nausea-vomiting Low blood pressure Colonic spasm

The data here tabulated is from references 3,4,5,6,7, given below.

When the clinical picture is suggestive of functional disorder, the diagnosis is supported by the presence of the following indications of autonomic liability:

Variable Blood Pressure  
Body Temperature Variations  
Changing pulse rate  
Deviations in B. M. R.  
Exaggerated Cold Pressure Reflex  
Oculo-Cardiac Reflex Abnormalities  
Glucose Tolerance Alterations

Therapy in these cases is directed toward: 1) relieving the somatic disturbance to prepare the patient for psychotherapy\*; 2) guidance in making adjustment to stressful situations and correction of unhealthy attitudes.

\*Drug treatment using adrenergic and cholinergic blocking agents in conjunction with sedatives.<sup>8,9,10</sup>

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The Editor sincerely solicits contributions of scientific articles for publication in ARIZONA MEDICINE. All such contributions are greatly appreciated. All will be given equal consideration.

Certain general rules must be followed, however, and the Editor therefore respectfully submits the following suggestions to authors and contributors:

1. Follow the general rules of good English, especially with regard to construction, diction, spelling, and punctuation.
2. Be guided by the general rules of medical writing as followed by the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. (See MEDICAL WRITING by Morris Fishbein.)
3. Be brief, even while being thorough and complete. Avoid unnecessary words. Try to limit the article to 1500 words.
4. Read and re-read the manuscript several times to correct it, especially for spelling and punctuation.
5. Submit manuscript typewritten and double-space.
6. Articles for publication should have been read before a controversial body, e.g., a hospital staff meeting, or a county medical society meeting.

The Editor is always ready, willing, and happy to help in any way possible.

## Editorial HEAD TRAUMA

Fortunately, most people who sustain head injuries recover spontaneously. In certain cases, specialized neuro-surgical measures may materially reduce both morbidity and mortality.

### Emergency Care

A careful survey of vital processes and of the general physical status of the injured patient is required in order to rule out complicating in-

juries to other parts of the body. Scalp bleeding may be controlled temporarily by a pressure dressing. Unless the hemorrhage has been excessive or other injuries are present, shock is rare. Adequate pulmonary ventilation is of importance since cyanosis and hypoxia cause edema of the brain which may aggravate existing brain pathology. Cerebral injury itself may tend to induce pulmonary edema. Aspirated mucus on the tongue can superimpose a mechanical obstruction of the airway. Simple posturing is usually adequate to eliminate these factors, but an endo-tracheal tube and even tracheotomy may be indicated if adequate ventilation can be obtained in no other way. Oxygen is indicated during the period of unconsciousness.

### Unconsciousness and the Lucid Interval Syndrome

An impairment of consciousness, which may vary from profound coma to a sensation of giddiness, follows brain injury resulting from head trauma. The "center" for consciousness has been localized to basal structures of the brain,—i. e., posterior hypothalamus, thalamic reticular system, peri-aqueductal gray matter. Actually, the state of consciousness and the severity of the head injury are correlated only if there is damage to this area. If the brain is recovering normally from the effects of trauma, the depth of coma should lessen in the following sequence of events:

- 1) *Coma* (no reflexes or responses to noxious stimuli),
- 2) *Stupor* (unconscious, with return of reflexes and response to pain),
- 3) *Restless confusion* (irrational, frequently violent behavior),
- 4) *Confusion* (disorientation, without restlessness),
- 5) *Automatism* (orientation, partially present but characterized by memory deficit),
- 6) *Lucid mental status*.

The so-called *lucid interval syndrome* is one characterized by a period of consciousness after a head injury, followed by a progressive loss of consciousness. This syndrome must be considered to indicate cerebral compression and constitutes a surgical emergency. Dural hemorrhage (extra-dural or sub-dural) is responsible for approximately 25% of the cases of this type. Cerebral contusion and edema, fat embolism or

pneumatocele may create this clinical picture. No explanation can be found in a few cases. The chances that a dural hemorrhage is present are enhanced if signs of focal neurologic dysfunction are present, appearing *after* the initial examination. The most reliable localizing signs are (1) ipsilateral pupillary dilatation and (2) intra-lateral hemi-paresis.

The statistical odds are somewhat against a dural hemorrhage as the cause of the lucid interval syndrome, but there is no way of eliminating the possibility without a trephination. Dural hemorrhages will cause death unless they are relieved surgically.

The diagnosis of a progressive dural or subcortical hematoma is more difficult if there is no lucid interval after the initial unconscious period. It has been demonstrated repeatedly that changes in the blood pressure, pulse rate, and respirations, frequently do not correlate with the apparent intra-cranial pressure in cases of unconsciousness after trauma. Specialized studies may be required in such instances.

#### Diagnostic Studies

1. *Skull x-rays* are not made until the convalescent period unless the clinical findings suggest a surgical complication, i.e., (a) scalp laceration with definite or suspected underlying fracture, (b) depressed skull fracture, or (c) lucid interval syndrome.

2. *Electro-encephalography* may be helpful in cases of the lucid interval syndrome, but is time consuming and not as direct as trephination. Its major value is in the more chronic phases to evaluate encephalopathy and epilepsy.

3. *Lumbar puncture* is of help in two particular instances:

(1) It is of limited value in diagnosis. When spinal fluid pressure is elevated in a patient with the lucid interval syndrome, the presence of a dural hemorrhage is to be strongly suspected, however, the pressure may be subnormal in some instances. Stiffness of the neck in head trauma usually indicates subarachnoid bleeding and a lumbar puncture only confirms this.

(2) The value of spinal fluid drainage in the therapy of head injuries is limited to cases of intolerable headache, nuchal stiffness and restlessness. In these patients, the initial pressure should be recorded, and fluid removed *slowly*, until the pressure has been reduced approximately 50%.

#### Other Therapeutic Problems

*Restlessness* often accompanies traumatic encephalopathy. Paraldehyde is as safe and effective as any drug in controlling this situation. Narcotics and other medullary depressants are to be avoided. The removal of a small amount of bloody cerebro-spinal fluid or the catheterization of a full bladder may relieve a restless patient, when drugs fail.

*Increased intra-cranial pressure* may accompany head trauma. Conservative measures to reduce edema are usually effective, including (1) adequate pulmonary oxygenation, (2) antibiotic agents to reduce the possibility of infection, and (3) normal fluid and electrolyte balance. The use of serum albumin and hypertonic solutions are being used less and less. Radical therapy consists of the removal of dural or subcortical hematomas.

*Rhinorrhea* and *otorrhea* indicate basal skull fractures through the cribiform area and petrous ridge, respectively. These conditions may lead to meningitis and brain abscess if the portal of entry becomes infected. Postural drainage, antibiotics and "neglect" of the affected area are usually effective prophylactic measures. The leakage from the ear nearly always stops within a few days, but occasionally rhinorrhea may persist. If rhinorrhea continues for a week or more, or if infection becomes apparent, surgical intervention is indicated.

#### Convalescence

Ambulation is encouraged as soon as the patient is lucid, symptom free and desires to be up. The guide to social and economic rehabilitation is good clinical judgment.

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HOSPITAL CASE NO. 28271**

The Case History in this discussion is selected from the Case Records of the Massachusetts General Hospital, and reprinted from the *New England Journal of Medicine*. The discussant under Differential Diagnosis is a member of the staff of the Massachusetts General Hospital. The other discussants are members of the Phoenix Clinical Club.

October 2, 1950

A sixty-year old unemployed carpenter was admitted to the hospital because of cough of five months' duration.

Two years before entry, the patient fell, striking his lower right chest against a stake. A roentgenogram was said to show questionable fracture of the eighth rib near the spine. After this, the patient began to have periodic pain in the region of the right nipple, occasionally radiating through to the back, to the right side of the neck and occipital region, or to the right axilla and right upper arm. These attacks occurred once or twice a week, and frequently accompanied damp weather or the lifting of heavy objects. The pain was sharp and intermittent. The patient was otherwise well and able to continue his work. Eight months before entry, there was some loss of appetite. Five months before entry, there was gradual appearance of cough productive of two or three tablespoonfuls of white sputum. The attacks of pain were aggravated by the cough. After a few weeks, the patient began to feel nauseated. Attempts at vomiting increased the cough. The sputum became foul, leading the patient to consult a physician. A roentgenogram of the chest was said to show "clouding of the right lung." The patient was given green liquid medicine and white pills. He remained in bed for about a month, with some resultant improvement in his general condition, and then returned to work. The sputum became increasingly foul and turned green. Two and a half months before entry, the sputum became pink, up to half a pint a day being raised. Gradually, the sputum became frankly bloody. Two months before entry, the patient was forced to stop work because shortness of breath. There was a weight loss of 10 or 15 pounds in the course of the illness.

The past and family histories were irrelevant. Venereal disease was denied.

On admission, examination showed a poorly nourished, chronically ill man of middle age, coughing and orthopneic. The veins over the neck and arms were prominent, more so on the left than on the right. The heart was of normal size, with a rough systolic murmur at the aortic area, poorly transmitted to the neck. Coarse rales were heard throughout the right chest, with occasional loud expiratory squeaks and groans over the right upper lung field. There was dullness over an area corresponding to the right upper lobe anteriorly, posteriorly and in the axilla. Breath sounds and vocal and tactile fremitus, however, were not altered in this area. A few small cervical lymph nodes and a solitary left supraclavicular node were palpable but not tender. The liver edge lay just below the costal margin. The abdomen was otherwise normal. There was early clubbing of the fingers. Neurologic examination was negative.

The blood pressure was 110 systolic, 55 diastolic, in the right arm and 105 systolic, 60 diastolic, in the left arm. The temperature was 99°F., the pulse 130, and the respiration 25.

Examination of the blood showed a red-cell count of 4,500,000 with 13 gm. hemoglobin, and a white-cell count of 16,000 with 84 per cent polymorphonuclears. The blood Hinton reaction was positive. The urine was normal. Culture of the sputum showed no beta-hemolytic streptococci.

A roentgenogram of the chest showed a huge irregular cavity occupying a completely consolidated right upper lobe. The cavity was about 6 cm. in diameter, and there were multiple nodular projections along its margins. There was only a small quantity of fluid. The arch of the aorta was dilated and prominent, with a suggestion of calcification. The heart was of normal size and shape. The ascending aorta was questionably prominent. There was no definite evidence of bone destruction in the ribs or vertebrae.

The patient continued to drain large amounts of foul-smelling sputum. He was given sulfadiazine. The temperature fluctuated irregularly between 98 and 105°F. On the eighth hospital day, coarse rhonchi were audible throughout both lung fields. The patient became increas-

ingly weaker, and cyanosis appeared. He was given gomenol, with good relief from the foul odor of the sputum. Death occurred later in the day, apparently from respiratory failure.

DR. LOUIS B. BALDWIN

Even by the most superficial perusal of this case one can be certain that there is a lung abscess involving the right upper lobe. The copious foul smelling sputum, gradual downhill course with fever and leukocytosis, and finally, the irrefutable x-ray evidence all point to this condition. But, to give an accurate chronological order of events leading up to the abscess is much more difficult. If one were to assume that the injury suffered two years previously was responsible for the pulmonary pathology leading to the abscess, then one would have to postulate a serious injury complicated by pneumonia and eventual suppuration. This train of events is possible, but in spite of the persistent chest pain there is no evidence of an acute antecedent pneumonia. On the other hand, Waddell, Sniffen, and Sweet describe a so-called chronic pneumonia lasting from nine weeks to ten years in which the onset may be insidious. The principal chronic symptoms were fever, cough, expectoration, and occasional hemoptysis. By x-ray a variable portion of the lung usually showed evidence of atelectasis or consolidation, and the possibility of carcinoma could seldom be excluded with certainty. Section of the affected portion of the lung showed an intense yellow color. In later stages there was a marked fibrosis. The yellow color was due to the presence of cholesterol esters. Occasionally, small abscesses were observed. If the accident had produced a chest wall injury with the development of osteomyelitis, one would expect extensive pleural involvement with empyema. Moreover, the original injury was of the lower and not the upper chest. The attractive rather simple conclusion that the lung abscess resulted from a preceding chest injury is therefore difficult to accept.

Suppurative pneumonia may be due to a variety of causes. The lungs may be involved by hematogenous implantations of septic emboli from distant foci or as a result of secondary infection following acute inflammations, such as measles and influenzal pneumonia. The most common cause is bronchiogenic aspiration of infected material from the upper air passages during operations under general anesthesia or

following trauma and unconscious states. In many instances suppurative pneumonia is synonymous to aspiration pneumonia. In other instances the disease is secondary to pathologic processes in the thoracic wall, esophagus, mediastinum, spine and other adjacent organs. Or the abscess may be secondary to other pulmonary diseases such as bronchiectasis, infarction and neoplasm. Occasionally tuberculosis may be complicated by a purulent abscess. In an analysis of 125 instances of putrid lung abscess, Sweet found that 56 per cent followed tonsillectomy or some other operation on the mouth, nose or throat; 11 per cent followed an operation on some other part of the body; a few followed normal delivery; about 4 per cent were caused by the aspiration of foreign bodies; 15 per cent followed infections of the upper respiratory tract or pneumonia. Finally in 12 per cent no cause was found.

The actual development of a putrid lung abscess, known to pathologists for many years as lung gangrene is caused by aspiration of anaerobic organisms normally present in the upper air passages of adults and found in abundance in those with pyorrhea and carious teeth. These anaerobic organisms include streptococci, fusiform bacilli, vibrios, spirochetes and grand negative bacilli acting in symbiosis.

It can be maintained from the above that the carpenter sustained a severe blow two years previously which caused unconsciousness and the production of an aspiration pneumonia, or that he might have sustained a pulmonary infarct. It is to be noted that ever since the injury there was periodic pain in the region of the right nipple radiating through to the back and to the right side of the neck. These symptoms might conceivably indicate some beginning upper right lung infection. It was not until five months before admission to the hospital that he developed symptoms of suppuration with productive cough and finally foul sputum. The x-ray at this time showed "clouding of the right lung", which is a rather vague description for our analytical purposes.

In order to cover the field of possible causes of the lung abscess other conditions must be considered.

Bronchiogenic carcinoma is not an uncommon cause of lung abscess. About 75 per cent of these tumors arise in a main bronchus. With enlargement, atelectasis develops, the tumor

penetrates the bronchus and spreads directly to the collapsed lobe. In about one third of instances Fishberg and Rubin found abscess formation. The factors leading to the development of abscess are obvious. The blocked bronchus causes a damming back of secretion which results in a suppurative broncho-pneumonia. Or else the rapidly enlarging tumor outgrows its blood supply and an anemic necrosis of the central part sets in, the necrotic tissue being eliminated through a communicating bronchus; secondary infection with pyogenic or anaerobic bacteria aids the ulceration and liquifaction. It is noteworthy that excavation occurs only in primary lung tumors according to Rubin. Three types of bronchiogenic carcinoma are recognized: (1) an epidermoid carcinoma usually of a squamous cell type; (2) an adenocarcinoma and (3) an anaplastic type, referred to as a small, spindle or round cell carcinoma.

Bronchiogenic carcinomas spread by direct extension as well as by lymphatic and blood channels. Epidermoid carcinoma, which is more common in the male, is relatively slow growing, and late metastasizing. It is not uncommon to find at autopsy instances of the latter limited to the affected lung and the regional lymph nodes without any evidence of tumor elsewhere in the body. In 3047 collected cases of carcinoma of the lung, Ochsner and DeBailey found the instances of metastasis in various organs as follows: regional lymph nodes, 72.2 per cent; liver, 33.3 per cent; pleura, 29.8 per cent; lungs, 23.3 per cent; bone, 21.3 per cent; brain, 16.5 per cent; heart and pericardium, 12.7 per cent; adrenal, 20.3 per cent; kidney, 17.5 per cent.

In 210 cases analyzed by Rubin, the present illness had existed less than a year in 60 per cent, and less than six months in 30 per cent. The history usually elicited is that of an aggravation of a pre-existing bronchitis, increasing pain in the chest, hemoptysis, and dyspnoea. There is often loss of weight over a short period of time, increasing weakness and epigastric discomfort. The vague abdominal symptoms may simulate malignancy of the gastro-intestinal tract. In Rubin's series, several of the patients traced the onset of their illness to an injury sustained some time previously, and in a few the injured site coincided with the later appearance of a metastatic deposit.

What is the evidence in this case to lead to a possible diagnosis of bronchiogenic carcinoma?

In the first place there is the age of the patient which is in the common cancer period. Then there are the enlarged cervical lymph nodes with a "solitary left supraclavicular node." Again, the slightly enlarged liver might be due to hepatic metastasis, and finally there are the prominent veins over the neck and arms, more so on the left than on the right. This might indicate metastasis around the subclavian vein with vascular obstruction. To be sure there is no anemia but there may be a compensatory polycythemia in keeping with the pulmonary osteo-arthropathy to mask this condition. Unfortunately, in the differential diagnosis between putrid lung abscess and broken down carcinoma, the roentgenogram is of little help, because in each instance there may be scalloping in the wall of the abscess, though this finding is more common in the carcinomatous abscess. The "multiple nodular" projections noted in the present case may therefore be due to a non-malignant abscess.

In a differential diagnosis of the cause of lung abscess, pulmonary cyst must be considered. There may occasionally be solitary and may become infected with the production of a lung abscess. There is nothing in our case to indicate a pre-existing cyst of the lung.

Tumors of the mediastinum must also be considered. A dermoid cyst of the anterior mediastinum might conceivably invade the lung with the development of a secondary lung abscess. The same could be said about the neurogenic tumors of the posterior mediastinum, although in each instance careful x-ray studies should reveal the mediastinal nature of the tumor.

Among other rare causes of lung abscess may be mentioned blastomycosis and actinomycosis. In these fungus infections there is more apt to be wide spread pulmonary involvement. I can see no evidence in this case of infection due to a fungus. Amoebic abscess of the lung and hydatid cyst almost invariably involve the base of the lung and not the apex.

From this survey of the possible causes of lung abscess the final diagnosis seems to rest between suppuration due to an antecedent injury or infection of the lung and bronchiogenic carcinoma. If the former proves to be the case there might well be a mediastinal or bone infection extending to the lung. One would have to postulate a low grade suppuration initiated at the time or shortly after the injury of two

years previously, eventually spreading to involve the lung. It is inconceivable, under such circumstances, that the morphology leading to the abscess had existed in the lung for a matter of two years without more striking evidence of chronic disease. Taking everything into consideration the diagnosis of bronchiogenic carcinoma is more probable. The positive Hinton is of no significance in the etiology of the abscess, even though in the older literature gummata of the lung were described, similar clinically to caseous or fibro-caseous tuberculosis. Excavation has been described with the development of an abscess. The changes due to syphilis are said to be more common in the deeper parts of the lung near the roots and the lower lobes. In view of the calcification in the dilated arch of the aorta seen in the x-ray, arteriosclerosis of the aorta seems more likely than aneurysm due to syphilis.

1. My first choice of diagnosis is bronchiogenic carcinoma, epidermoid in character with the secondary development of putrid lung abscess and metastases to lymph nodes.

2. My second choice would be chronic lung abscess.

#### DR. BEN P. FRISSELL

We have today a problem of differential diagnosis of gangrene or putrid abscess of the lung. It will be conceded by all, I believe, that this man died of sepsis localized in the upper right lung field. The origin of this process requires consideration.

We are given a 60-year old carpenter who dies on his 8th hospital day who apparently presents himself for hospitalization five months after he began to complain of cough productive of small amounts of colorless sputum which gradually changed character from mucoid and odorless to purulent and foul and, subsequently, to pink and frankly bloody purulent sputum.

There is no history given to indicate fever at the onset of this illness and no evidence of chest pain at the onset. Three months before the patient first noticed cough, he noticed lack of appetite. Along with the symptoms of cough, he developed nausea. His cough was aggravated by vomiting. During the period of several months before his admission to the hospital, he lost 10 to 15 pounds in weight and entered the hospital in a poorly nourished or emaciated state.

Two years before admission, the patient suffered an injury to his right chest, presumably falling against a stake while at work as a carpenter, striking his lower right chest. X-ray was said to show questionable fracture of the eighth rib posteriorly. Presumably, there were no other pulmonary findings on x-ray at that time. Following this injury, the patient began to complain of periodic pain in the right chest anteriorly. He also had pain radiating to the right side of the neck, the occipital area, and the right axilla and upper arm. These attacks were periodic and were aggravated by damp weather, lifting, etc. The pain was sharp and intermittent. The patient continued to work, however. He felt well otherwise for a year and a half after his injury.

On examination, at the time of hospital admission, there were evidences of extensive involvement of the entire right upper lobe apparently, with dullness and coarse rales throughout this area. There were no definite physical signs of cavitation but an x-ray revealed a large irregular cavity occupying a completely consolidated right upper lobe. The cavity was described as about 6 cm. in diameter with multiple nodular projections along its margins. It contained a small amount of fluid. The arch of the aorta was dilated and prominent with suggestive calcification compatible with the age of the patient. There was no evidence of bone destruction, no mention of any mediastinal shift. At the time of admission to the hospital, the patient was raising about  $\frac{1}{2}$  pint of purulent, foul-smelling, bloody sputum. There were noted on examination small cervical nodes (we are not told whether they were left or right, or both) and a solitary left supraclavicular node. The neck veins were described as full, particularly on the left side. We note these findings in spite of the fact that the lung findings were limited to the right chest. There was no notable variation in the blood pressure reading of the right and left upper extremity. The patient was coughing and having definite respiratory difficulty. There was increase in pulse rate and respiration.

Given then a putrid abscess or gangrene of the right upper lobe in an elderly man with a history of injury to the right chest two years before his death, what are the diagnostic possibilities: Lung abscesses have been variously classified and are due to a multitude of causes.

Judd offers a simplified classification which would appear adequate for our needs in this discussion: (1) Inhalation or aspiration-type abscesses. Seventy per cent of lung abscesses are said to follow post-tonsillectomies or dental extractions and an additional 12% are said to follow other post-operative procedures where a general anesthesia is used, thus accounting for better than 80% of suppurative lung lesions. (2) Respiratory-type abscesses following either infections of the lungs, such as acute pneumonia or chronic lesions such as bronchiectasis and obstructions to the bronchial tree from various origins including malignancy, of course. This group accounts for 15% of such lesions. (3) Embolic abscesses arising from septic infarcts, etc. This latter group and the small percentage of lung abscesses of undiagnosed or unknown origin account for the remaining 5% of lung abscesses, according to Judd's classification.

I believe that we can dispense with the first group from the history alone in the case at hand. We have no knowledge of foreign body aspiration or of surgery of any type. The third group raises the question of a septic embolus which of course brings up any possible connection with the original injury one and a half years before the onset of the patient's symptoms referable to his lungs. The onset, in the first place, is not that of an infarct. We have no history of pain and bloody sputum and an embolus or infarct, unless massive, would be expected to be peripheral in its location whereas this lesion apparently originated in the hilar region of the lung. Dr. Moore could probably elaborate for the rest of the afternoon on the industrial implications of this case, assuming that this man's original injury was of that nature and, if it occurred in Arizona, undoubtedly it would have been. We are all well aware of the tendency of patients, particularly industrial, to tie in the symptoms with traumatic experiences however remote and unrelated they might appear from a medical standpoint.

This brings us down to the second group of the so-called respiratory abscesses. First, let us consider the infections, or rather the non-obstructive respiratory lesions which might enter into this situation. I would like to dispose at this point of one red herring; i.e., the positive Hinton. We have all been educated in our earlier years as to the diagnosis of syphilis of the lungs and we have heard that diagnosis made and

discussed in this Clinic but, to my knowledge, never authenticated. And I choose today to go along with this school of thought which holds that this entity, although much talked-of and discussed, seldom, if ever, is seen.

*Tuberculosis:* Does not appear to be worthy of much comment, although Dr. Williams has given us a very brief, concise analysis of the sputum, leaving this possibility open for us to think about. The age of the patient, appearance of the cavity and the lung field by x-ray are against this diagnosis.

*Cystic disease of the lung:* Not likely. Negative x-ray two years before death, an elderly man, solitary abscess. I am thinking of course of the so-called congenital cystic disease. Hydatid cyst of the lung, likewise not likely. This type cyst is usually in the lower right lung field in the areas adjacent to the liver, from which this lesion reaches the lung usually by direct extension.

*So-called fungus infections of the lung,* notably coccidioidomycosis and actinomycosis may be mentioned. Sputum studies, appearance of the lung on examination are certainly not characteristic or suggestive of coccidioidal infection, and, on this basis alone, I would rule out this diagnosis. Actinomycosis, I do not feel is likely. We have no history of exposure. The onset is not typical, there are no draining sinuses which are common in this disease, the character of the sputum is not described for this syndrome. The diagnosis, of course, is made by sputum analysis.

In considering the pyogenic lung abscess, we are undoubtedly dealing with the so-called putrid type of abscess which signifies anaerobic bacterial flora; i.e., anaerobic streptococcus, Vincent's organisms, etc. The onset of symptoms is not characteristic of the post-pneumonic or influenzal-type abscess nor do we have a history compatible with a diagnosis of long-standing bronchitis, or bronchiectasis which, in the typical instance, would be involving the lower lung fields, probably bilaterally.

This leaves us with the group of so-called obstructive lesions capable of producing atelectasis and subsequent infection and abscess formation to the point of pulmonary gangrene. Neoplasms enter into this situation quite prominently. From the sequence of events in this case, it is my conclusion that we have had for an indefinite period of time, probably up to two

years, a progressive obstructive lesion with involvement of the right upper main stem bronchus and other mediastinal tissues, particularly in the upper mediastinum. There is a good possibility that there has been involvement of the apical portion of the lung as evidenced by symptoms of pain in the right shoulder, pain down the right arm, and pain up the right side of the neck indicating the possibility of some involvement of the brachial plexus, which is not an uncommon symptom in one type of carcinoma of the lung, the so-called apical carcinoma spreading along the lymphatics and the pleural surfaces. This type of cancer usually invades locally, seldom metastasizes, although it may erode the bony rib cage in some cases. Compression symptoms are quite common. This type of tumor would undoubtedly explain a good portion, if not all, of the patient's post-traumatic symptoms of pain over a period of two years because the invading process may involve the upper mediastinal structures and the superior pleural surface of the lung a relatively long time before obstructive symptoms occur from involvement of the main stem bronchus. Tumor growths capable of producing this picture can either originate in the lung, they may be benign or malignant, or may be metastatic from other malignant sources in the body with metastases to the mediastinal glands and subsequent obstructive symptoms. They may be primarily lymphatic in origin in the mediastinal structures, notably the so-called malignant lymphomas including in this classification Hodgkin's disease and lymphosarcoma, particularly.

To differentiate these groups is beyond the scope of this discussion because the final diagnosis will have to lie on bronchoscopic findings, and, or, microscopic studies as the result of surgery, or autopsy. Numerous so-called benign lung tumors have been described. Most likely if we were dealing with this diagnosis in this case it would be the so-called design bronchial adenoma which some investigators feel may be a precursor to definite adenocarcinoma in late stages of the disease. The indications of some gastrointestinal tract involvement in the early stages of this man's symptomatology raises the question of a metastatic lesion arising in the stomach. The palpable left supraclavicular node has often been described as a sign of stomach carcinoma. Any time this lesion is found, deeper-seated mediastinal gland involvement must be

anticipated. Likewise, the findings of compression involving the left mediastinum suggest primary mediastinal involvement. However, simply because we have definite involvement of the main upper right stem bronchus is no reason to conclude that the lesion could not be also involving other mediastinal structures through lymphatic spread. Among the symptoms of carcinoma of the lung is frequently mentioned the incidence of anorexia and vague dyspeptic and upper gastrointestinal symptomatology. This is not too mysterious when one considers the close proximity of the esophagus to the main stem bronchus, the carina, and the adjacent mediastinal structures.

I am inclined to go along with Rubin, Judd, and other investigators who feel that in obscure lung lesions occurring in elderly individuals, a diagnosis of cancer of the lung is present until definitely proved otherwise. We are all aware of the apparent increasing incidence of pulmonary carcinoma. A disease which a few decades ago was considered a rarity is now known to be quite common. A recent survey of the autopsy reports from Montefiore Hospital in New York City, show carcinoma of the lungs occurring in 5% of their autopsies during the period from 1914 to 1944. Other hospital reports indicate 1% to 2% incidence of lung carcinoma and 10% of all carcinoma cases. A 1942 census report indicated approximately 6,000 deaths from this disease. Several factors are concerned in apparent increase in incidence of this disease: (1) An aging population, (2) Improved methods of diagnosis, particularly bronchoscopic surveys, and biopsies, laboratory smear technique, etc. (3) Recent work on inhalation irritants including tobacco smoke. The age incidence of carcinoma of the lung is 40 to 60. Males outrank females three to one. The origin is usually in a major bronchus in 75% of cases. Periphery of the lung is involved in only 25%. The upper lung field is involved in most instances. Complications include atelectasis, emphysema, and abscess formations in about 35% of cases, particularly when there is involvement of the main stem bronchus. These changes originate from impaired circulation, obstruction, and secondary infection. Metastatic lung tumors in the peripheral or mid-lung fields rarely suppurate but this does not hold for the metastatic involvement of the mediastinal structures producing secondary involvement of the bronchus.

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Histologically, carcinoma of the lung can be divided into three main types: the so-called epidermoid or squamous cell type originating from the outer layers of the bronchial mucosa most likely to produce obstructive symptoms, in my estimation, most likely to have been the cause of this man's death; adenocarcinoma arising from the submucous layer of the bronchus; and the so-called anaplastic or spindle-cell type originating from the deeper structure of the bronchial mucosa. The last type is less differentiated and, has a tendency to more widespread metastases than the first two types mentioned. The symptoms of carcinoma of the lung are quite variable. The onset is usually insidious. The duration of symptoms before diagnosis: 30%, six months; 90%, one year. The duration of symptoms before death usually two years or less. Certainly all of the symptoms that this man presents could be explained on the basis of the above diagnosis. To mention a few: Cough, tendency to recurrent pulmonary infection, pain in the chest, hemoptysis, dyspnea often-times out of proportion to x-ray findings, noisy respirations, loss of weight (this is invariable), increasing weakness, epigastric distress, minor gastrointestinal symptoms, cachexia, history of injury is obtained in a great many cases that have been studied, clubbing of fingers may occur in the late stages of the disease. Review of our protocol would reveal that most, if not all, of these symptoms, are exhibited in our case. Symptoms of infection and development of abscess of a fetid type are not uncommon, abscess formation and empyema occurring in the terminal stages of a good percentage of cases.

IN CONCLUSION, I believe that our patient died of gangrene of the lung specifically the right upper lobe on an obstructive basis most likely due to primary bronchogenic carcinoma, so-called cancer of the lung, or conceivably due to metastatic carcinoma from the upper gastrointestinal tract or malignant lymphoma of the mediastinal structures.

DR. JAMES R. MOORE

This was a chronically ill, poorly nourished man—I'll not say, as might some of my younger colleagues, "old man"—of 60 years. He had been in apparent good health until eight months prior to his death, aside from periodic chest pains which followed a fall and contusion of the right lower chest two years before. This

injury, incidentally, is discounted as having no significant connection with his final illness.

He had a prominent, dilated mildly calcified aortic arch, an aortic systolic murmur, prominent veins of the upper extremities, and a positive blood Hinton. If this were all, we would say he had an aortic aneurysm, and he probably did, but more significant findings as related to his acute illness are present in the lungs. The entire upper lobe of the right lung was completely consolidated, in which there was a six centimeter cavity showing nodular marked marginal projections. There was only a slight amount of fluid present in the cavity. A productive cough had appeared five months before entry into the hospital. At first there were only two or three tablespoonfuls of a white sputum daily but it gradually increased in amount becoming green and foul, and within two months as much as a half-a-pint daily was raised. When the sputum became profuse it was tinged with pink, and later became frankly bloody. The record is strangely silent with reference to examinations of this sputum except to state that a culture of the sputum showed no beta-hemolytic streptococci.

Blood examination showed the R.B.C. and hemoglobin components to be holding up remarkably well. There was a moderate polymorphonuclear leucocytosis of 16,000 which would be consistent with the demonstrable lung infection and septic fever accompanying it.

The above lung findings of:

1. X-ray evidence of consolidation with cavity formation.

2. Cough with quantities of foul bloody sputum, and

3. A septic fever, certainly mean lung abscess.

This however, does not constitute a complete diagnosis as the causes of the lung abscess are many and varied.

1. Foreign body can be reasonably ruled out in this case from the negative history.

2. Bronchiectasis; there was no previous history of this condition and the location of the principle pathology as shown by X-ray would be against bronchiectasis.

3. Abscess formation in the so called "unresolved pneumonia"; again there is no history of such infection in this case.

4. Abscess formation following infarction of the lung from a pulmonary embolus; again there is no such history present.

Refresh...add zest  
to the hour



5. Secondary infection and abscess formation in a tubercular consolidation.

6. The development of a secondary infection and abscess in an area of atelectasis, secondary to bronchial blockage.

The most common, as well as the most important cause of bronchial blockage, is bronchogenic carcinoma. From a consideration of the onset, progress, physical and laboratory findings, I think this man had a bronchogenic carcinoma, involving branch of the upper main stem bronchus on the right, with occlusion and resulting atelectasis of the upper lobe, an abscess that developed in this area as a result of secondary infection, with death occurring from the toxic state.

From recent literature the following brief, rather dogmatic, statements with reference to cancer of the lung have been gleaned.

1. Bronchogenic carcinoma may simulate any pulmonary disease, but none more successfully than tuberculosis.

2. The X-ray appearance may resemble (a) benign tumors, (b) tuberculosis (c) filled cysts (d) chronic abscess (e) localized bronchiectasis.

3. The symptoms, physical signs and clinical

course are not characteristic, and do not assist in the diagnosis of early bronchogenic carcinoma.

4. The only hope for a cure is by surgery in the stage before the above symptoms, physical findings and clinical course, become suggestive of the condition.

5. Diagnosis of early bronchogenic carcinoma depends upon the presumptive x-ray findings.

6. It is wise to consider abnormal lung shadows in men over 40 years of age as caused by cancer until proven otherwise.

7. Exploratory thoracotomy when in doubt is the safest course. Palliative treatment, rest cures, and watchful waiting result in deceptive responses and greatly lower the chances of successful treatment.

8. Mass surveys, even by miniature x-rays, will increase the incidence of early detection and enhance the chances for successful treatment.

In reference to the case under discussion it is suggested that bronchoscopy may not have been done because of the advanced stage of the disease when he was first brought to the hospital. No record is contained in the file with

reference to cellular study for tumor elements, but this may have been before the advent of the Papanacalou stains. The fact that the record of treatment contains no mention of anti-biotics may date this case as having occurred before the age of the "miracle drugs," and cytological diagnosis.

#### SUMMARY:

In summary then, my diagnosis is as follows:

1. Lung abscess in atelectatic lobe, secondary to bronchial blockage, by carcinoma.
2. Possible luetic aortitis and early aneurysm of the aortic arch.

#### DIFFERENTIAL DIAGNOSIS

Dr. Edward D. Churchill: We know that breath sounds are widely transmitted throughout the chest. I examined a man yesterday whose entire right lung had been removed three years previously: in the right axilla, there were normal breath sounds, tactile fremitus and vocal resonance. He had a thoracoplasty, but the transmission of the sounds from the left lung suggested a normal right lung in the axillary region. Pulmonary resection is giving us a new concept about transmission of sounds into the area over which one is listening with a stethoscope. The x-ray film in the case under discussion makes it obvious that the underlying lung could not produce normal breath sounds. They must have been coming through from adjacent segments of lung.

"There was early clubbing of the fingers." I do not like the term "early". It implies that in a few months it will increase. We have no evidence for that. Some diseases give slight clubbing, others extreme clubbing, and others no clubbing of the fingers. The term "early" means slight or moderate.

I often wish we had a more ample terminology to describe the odor of the sputum because so often the diagnosis can be made by this means alone. Varying odors of the sputum are like the bouquets of vintage wines. The word "foul" does not mean anything and, in addition, always startles the patient. It may be more informative to ask if the sputum has a bad taste. The patient will tell you that his sputum tastes bad, but if you ask if it is "fowl," he will say no. It is unfortunate that we are lacking a precise descriptive vocabulary for the subtle odors so useful in clinical medicine.

The x-ray film is quite important. There is a huge irregular cavity within a homogeneously

dense right upper lobe. The x-ray department are overstepping when they refer to a "consolidated" right upper lobe if they imply consolidation in the pathologic sense. The cavity is 6 cm. in diameter. There are multiple nodular projections along its margins.

Will you comment on the x-ray film, Dr. Schatzki? Do you care to make a more clearly definitive statement regarding calcification and prominent of the ascending aorta?

Dr. Richard Schatzki: There is definite calcification in the arch of the aorta. I should say that the ascending aorta is dilated, and also the arch. The descending is normal in size so far as I can see on the film.

Dr. Churchill: Is the heart of normal size?

Dr. Schatzki: Yes.

Dr. Churchill: Is there anything to add to the description of the cavity?

Dr. Schatzki: I think it is a fairly good description. You are right in considering the term "consolidation" a poor one. It is very often erroneously used in the sense of density, as you know.

Dr. Churchill: Let us take up the question of cardiovascular disease. There was a positive blood Hinton reaction, a dilated aorta, with calcification in its walls, a rough systolic murmur over the aortic area and a blood pressure of 110 systolic, 55 diastolic.

Dr. Breed, do you want to pick that up from the medical standpoint and tell us what was wrong with the cardiovascular system?

Dr. William B. Breed: I do not believe that the variation of blood pressure between the right and left arms was more than normal. The mere recording of such figures tends to call more attention to the variation than is justified. The pulse pressure of 50 to 55 without an aortic diastolic murmur is not particularly significant, and in the x-ray picture the possibility of syphilitic aortitis is not so likely as an arteriosclerotic aorta in a man of sixty. However, I should like to question Dr. Schatzki a little more specifically on that point—can one differentiate by this x-ray film a syphilitic from an arteriosclerotic process?

Dr. Schatzki: You mean so far as tortuosity and dilatation of the aorta are concerned. In a large number of cases of syphilitic aortitis, we call the aorta normal, knowing that we cannot see significant pathologic changes in many of them. We usually make an understatement

rather than an overstatement in that respect—it is better not to call the aorta dilated than the other way around. But when we say dilatation, I think it is quite dilated, and this particular aorta was dilated in that sense. There is not such a degree of dilatation in arteriosclerosis unless there is a dissecting arteriosclerotic aneurysm.

Dr. Breed: You never speak of a tortuous aorta as dilated?

Dr. Schatzki: We should not per se. I think that is a definite mistake.

Dr. Churchill: Do you say that this was syphilitic aortitis?

Dr. Tracy B. Mallory: How about the calcification?

Dr. Schatzki: I should say that syphilitic aortitis with dilatation shows calcification in a very large percentage of cases. As a matter of fact, the presence of calcification rather proves than disproves the diagnosis, particularly if the calcification is in the ascending aorta.

Dr. Churchill: Do you agree with that Dr. Mallory?

Dr. Mallory: I agree with Dr. Schatzki that calcification in the thoracic aorta is unusual in the arteriosclerotic aorta except in advanced cases; in the abdominal aorta, it is a different proposition.

Dr. Schatzki: I cannot see calcification in the ascending aorta. We often see calcification in the arch of an arteriosclerotic aorta, just where we see it in this particular case. If it were in the ascending aorta, it would be more in favor of syphilis.

Dr. Mallory: I should have qualified my statement. Calcification is common in the arch. A favorite spot is the dimple of the ductus arteriosus. In the ascending and frankly descending portions, I do not believe we often see it.

Dr. Schatzki: We do in very advanced cases.

Dr. Churchill: Dr. Breed, you are still my medical consultant. What do you call this?

Dr. Schatzki: If the patient had no definite evidence of regurgitation, I do not see how we can decide the question. Is that right?

Dr. Breed: Yes, he had no diastolic murmur. This does not rule out syphilitic aortitis, but it is evidence against it.

Dr. Schatzki: The fact that the heart shadow was normal probably rules out aortic regurgitation.

Dr. Breed: Yes, probably.

Dr. Fuller Albright: Was the aortic second sound recorded?

Dr. Mallory: There is no note on that.

Dr. Churchill: Then you interpret this, Dr. Breed, as syphilitic aortitis?

Dr. Breed: I shall take the arteriosclerotic side, for the sake of argument.

Dr. Schatzki: I shall take the syphilitic side.

Dr. Churchill: We know that the patient had a pulmonary abscess, with a fluid level in a cavity and foul sputum. The only question is, was this abscess in the center of a cancer, or was it not? We have no direct evidence for cancer other than the x-ray film and the course of the patient, which, however, is perfectly consistent with a noncancerous lung abscess. The history and physical examination do not point either way. The question whether or not this was an abscess within a cancer comes down solely, it seems to me, to interpretation of the film. I maintain that the thickened wall, with the nodule extending into the cavity, indicates that it was a necrotic tumor—a primary cancer. I can come to no other diagnosis. That is an x-ray diagnosis, and I should like to check it with Dr. Schatzki.

Dr. Schatzki: You must remember the cases in which we used the same reasoning and were wrong! In those cases, a markedly irregular outline of the inside of the cavity turned out to be caused by debris in an abscess.

Dr. Churchill: I do. The debris abscess gives a thumbnail appearance, rather than the picture presented by this case.

Dr. Schatzki: I agree; and from this film I should not hesitate to call it cancer.

Dr. Churchill: I can reach no other conclusion on the evidence. The clinical course could go with either. So that, purely on the x-ray visualization of the lesion, I say lung abscess within a primary cancer of the lung.

Dr. Mallory: Do you accept Dr. Breed's or Dr. Schatzki's opinion regarding the aorta?

Dr. Churchill: I have no competence to decide between them. I shall let the two gentlemen argue it out.

Dr. Breed: Dr. Albright suggests that if this was cancer in the right upper lobe, it may have pushed the aorta over to make it appear larger than it was. I think that is a good point.

Dr. Schatzki: I think we can differentiate between tortuous aorta and dilated aorta if it is markedly dilated.

Dr. Mallory: Would anyone care to defend a primary aneurysm occluding a bronchus by external pressure and secondary abscess of the lung?

Dr. Churchill: I am not willing to accept this as aneurysmal phthisis.

Dr. Oliver Cope: Would Dr. Churchill mention gumma with abscess?

Dr. Churchill: I can mention it.

Dr. Cope: And would you exclude it?

Dr. Churchill: Not definitely. I can mention it as one of the things that turn up now and then when we are wrong. It is like the safeguard of the medical student who always puts syphilis down at the end of a list to include everything in his differential diagnosis; it might be syphilis.

#### CLINICAL DIAGNOSES

Carcinoma of lung, with secondary abscess.  
Syphilitic aortic aneurysm.

#### DR. CHURCHILL'S DIAGNOSES

Carcinoma of lung, with secondary abscess.  
Cardiovascular disease involving aorta, nature undetermined by medical and radiologic consultants.

#### ANATOMICAL DIAGNOSES

Carcinoma of upper-lobe bronchus of right lung, with secondary abscess.  
Metastasis to regional lymph nodes and left adrenal gland.

Syphilitic aortitis with aneurysm.

Bronchopneumonia, terminal.

Urolithiasis medicamentosa (sulfadiazine).

#### PATHOLOGICAL DISCUSSION

Dr. Mallory: Autopsy showed a mediastinum filled with a large aneurysm, syphilitic in origin. It replaced the arch, half the ascending the almost two thirds of the descending aorta, stopping sharply at a point about 4 cm. above the diaphragm. The dilated descending aorta has been reflected over the left lung. The cavity in the right upper lobe appears black, and a white tumor nodule is visible in the bronchus to the upper lobe. Smaller tumor masses surround the cavity. The syphilitic aneurysm was apparently coincidental and had nothing to do with the symptoms.

Dr. Breed: Then it is merely an academic discussion of x-ray diagnosis. The disease had nothing whatever to do with the patient's health or death.

Dr. Mallory: So far as this cardiovascular syphilis is concerned?

Dr. Breed: Yes.

Dr. Mallory: That is true.

There were metastases to the adrenal glands. They were the only distant metastases found.

Dr. Churchill: Was it an epidermoid carcinoma?

Dr. Mallory: It was so undifferentiated that we did not classify it.

Dr. Schatzki: Where did the dilatation start?

Dr. Mallory: It began shortly above the valve, 1.5 cm. to be exact, but was only slight, measuring 8 cm. in circumference up to the arch; then it widened to 10 and 14 cm. farther on.



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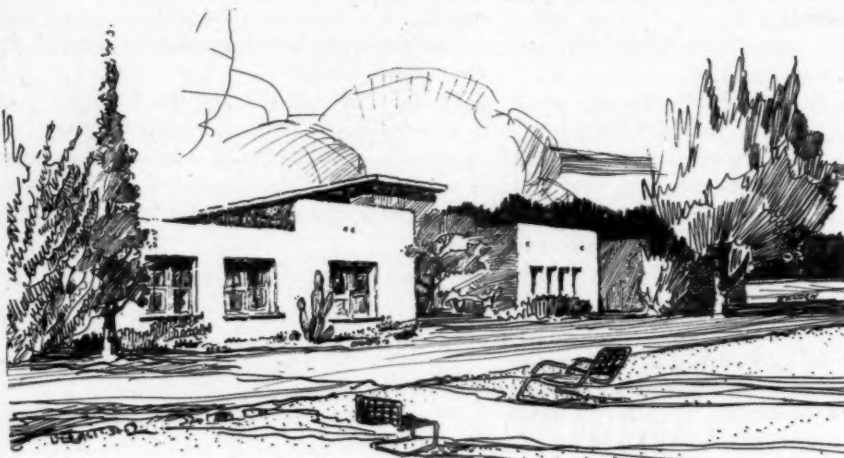
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ARIZONA

## TOPICS OF CURRENT MEDICAL INTEREST

### RX, DX, AND DRS.

By GUILLERMO OSLER, M.D.

The newest announcement of help for ARTHRITIS is that of Milwaukee's Tufts, Pessin, and Greenwald. . . . They have obtained a serum from placenta and umbilical cords which they call P.B.S. (PLACENTA BLOOD SERUM). . . . Nine patients have been treated with success; all maintained the gain after cessation of the therapy; and none have had acute corticoid effects. . . . This fits in with the remissions during pregnancy which Hench has stressed, but its value (like that of transfusions from pregnant women) remains to be confirmed.

Dr. Edgar Gordon, onetime contributor to this journal, has done it again, herewith. He is reported, in HOSPITAL MANAGEMENT, as having given a paper at the Armour Laboratories' Second Clinical Conference on ACTH. The INTRAVENOUS 'CONSTANT DRIP' USE OF ACTH produces a long "stimulation pressure" on the adrenals, and the total effect is said to be about 20 times that of a single subcutaneous injection. . . . Iso-

lated case-reports of the successful use of ACTH in black-widow spider and snake toxicity were given by other authors, and are being checked by further study in humans and animals.

It is estimated that A PATIENT PAST 65 YEARS OF AGE has 55 in 100 chances of dying from cardiovascular disease. . . . Neoplastic causes can be specially considered at earlier ages if the family history is suggestive. A predominance of carcinomas and an absence of C.-V. lesions in several generations of a family might allow one to not only be alert for neoplasms, but even point the site where they are most likely to occur.

The FAMILIAL TENDENCY OF CERTAIN CARCINOMAS has been mentioned in this column. An article on multiple neoplasms was published in ARIZONA MEDICINE about two years ago. . . . Vanden Berg of Grand Rapids, Michigan, has recently reported an amazing family in which the mother, two daughters, and a granddaughter

have had breast tumors. In addition, the mother and daughters had bilateral tumors. Furthermore, the sequence of development in each was the same—left breast, right breast. To be more coincidental, the lesions of the daughters were identical in each breast—2 o'clock, 3 o'clock. And finally, the granddaughter has her first tumor at the age of 36 years in the LEFT breast, and at 2 o'clock.

The Schering Corporation's ABSTRACTS OF MEDICAL ARTICLES IN LAY JOURNALS continue to be interesting. . . . Some of the subjects one could predict, such as "Are You A Fertile Male" from *ESQUIRE*, "The Look You Like Is Yours For The Eating" from *SEVENTEEN*, and "Why Can't Our Mothers Breast-Feed?" from *The Ladies Home Journal*. . . . Other titles are hardly predictable, tho. *The SAT. EVE. POST* comes up with an article on stellate ganglion blocks for apoplexy; *PAGEANT* has one called "Good News About Miscarriages"; and *CORONET* tops the list with "Does Rhythm Work In Birth Control?"

A few unfortunate physicians do not have access to *ARIZONA MEDICINE*, but may be able to read *GOOD HOUSEKEEPING*. For those who can read A.M. but not G.H., we can report the medical aspects of the latter journal. . . . As has previously been said, women are served their medical knowledge in strong doses. A monthly page called 'Keep Up With MEDICINE' is composed of about ten paragraphs on such topics as the modern therapy of Parkinsonism, the electrophrenic respirator, the four chief regulators of vital processes (enzymes, hormones, vitamins, and genes), etc. . . . In the January issue there is also a 14-page section called the 'Comprehensive Home Medical Chart', prepared under the supervision of Dr. Morris Fishbein. One portion provides definitions of medical specialists; another catalogues the diagnosis and treatment of skin disorders; a third does the same thing for 'winter ailments'; a fourth shows the use of preventive inoculations; and a final two pages gives the indications for 16 standard tests and their significance. . . . Very graphic and useful, with quite a few points of interest to physicians—or can you recite quickly the interpretation of the Schick and Dick tests?

Herrell of the Mayo Clinic has confirmed other work on the wide 'spectrum' of action which aureomycin has in PNEUMONIAS. . . . Since it is effective for infections caused by many bacteria and viruses, it may even be 'given for pneumonia, period!' when bacterial studies cannot be made. . . . This brings us back to the suggestion attributed to a Harvard student in 1943—"Admit the patient to the hospital. Give penicillin for 24 hours. If there are still complaints at that time, take a history and do a physical."

The journal 'Minnesota Medicine' has several recent papers on various aspects of THE LUNGS. . . . Dr. Eugene Pendergrass of Philadelphia gives a solid but modern summary of The Roentgen Diagnosis of Silicosis. He includes an analysis of the piezoelectric theory, a conception of Evans and Kascht which was reported in this column before its publication (thru the courtesy of Dr. Oscar Sander). . . . Dr. William Eisenstadt of Minneapolis describes The Management of Status Asthmaticus better than Barach and others have done, and as tho he had learned it in Arizona. Actually, he quotes the late Dr. Kibler of Tucson, and his summary of methods is well worth while. . . . The third paper is an intriguing discussion of Ciliary Action and Atelectasis by Dr. A. C. Hilding of Duluth. The physics and Physiology of the bronchi are contrasted with those of the sinuses, the ear, and the anterior chamber of the eye, of all places.

The combination of an anti-histamine agent with 'cold' tablets was bound to come, and has. . . . Some peculiar restraint has prevented the addition of vitamins and antibiotics, but such a move might have made the pills more useful. . . . The current preparation is very nearly based on the formula  $O+O=O$ , according to the general feeling about oral 'cold' vaccines, and even the anti-histamines.

BROMINE INTOXICATION has been re-emphasized by Perkins of Boston City Hospital in the Archives of Internal Medicine. . . . He reported a number of proved cases, and stated that 5 per cent of cases admitted to a mental hospital have brominism. M.D.'s are responsible for about 50 per cent of the cases. . . . The signs are difficult, multiple, and variable, but the spinal fluid protein is elevated in two-thirds of those intoxicated. (An 'Arizona Medical Problem' in the March 1949 *ARIZONA MEDICINE* was a fine example of the confusion which bromides can produce in patient and his diagnosis.)

It would seem that Phoenix and Tucson might be ideal locations for a SOCIAL SERVICE CONSULTANT, employed by the medical societies themselves. This idea is a part of the famed Alameda County plan, but can be used by itself when the profession wants or needs to estimate the financial status of transient or recently arrived families. . . . The right person could be invaluable as an investigator and counsellor, and a 'fair-fee setter' in such cases.

The people from Boston are often ridiculed, and sometimes considered to be decadent. This may be done gently, as by Cleveland Amory (once of Tucson, and always of Boston) in 'The Proper Bostonians', or in several books by J. P. Marquand. . . . One may also rib fair Harvard in many ways, but rarely about medicine and never about

hematology. In recent times they have had several of the most notable hematologists in the world. Dr. Minot has just died. Dr. Castle described the theory of pernicious anemia. Drs. Strass, Taylor, Heath, and others, have formed the nucleus of the noted Thorndike Laboratory, along with the other two. Dr. Diamond has been Chief of the National Blood Bank consultants, as well as a pioneer in erythroblastosis. A handy transfusion method was recently described by a Bostonian. . . . Now Dr. Edwin J. Cohn has developed a new machine which speeds the continuous processing of whole blood into 9 fractions in a period of hours instead of several days. The fractions may be kept for a year instead of a month. . . . A 32-foot trailer truck has been constructed which is actually a blood refinery on wheels. It can handle 200 pints of blood per day, and glean the crop from a wide area.

Drs. Bacon and Sherman have listed the factors which have reduced the mortality rate following RESECTION OF THE COLON from 20% to 5% in the past 10 years. . . . A good preoperative protein balance, including a high intake of protein concentrates; intestinal antiseptics, with oral sulfathalidine for days and oral streptomycin for 2 days pre-op.; penicillin IM after surgery; oxygen saturation during the immediate post-op. period, using the BLB mask when sedation is greatest; 2,500 to 4,000 cc. of fluids parenterally until that amount can be taken orally (5% glucose preferred to saline; whole blood used as indicated by R.B.C. count and hematocrit); Wangenstein suction and Babcock sump drain for 2 to 3 days, until peristalsis begins; close observation for phlebothrombosis and thrombophlebitis, with I-V heparin and oral dicumarol if indicated; early ambulation, with patients up on the first or second post-op. day. . . . These methods allow operation on the older age groups, with little greater hazard.

One of the more ghoulish ways to sell a book has recently been presented to physicians. The book is a 'satire' (sic) on morticians. . . . Physicians are urged to buy it by the author on the tenuous and unrelated grounds that HIS father was a doctor. . . . The names of the book and author are deliberately not mentioned here on the grounds that G. Osler's father was also a doctor.

"One teaspoonful of salt, one half teaspoonful of baking soda, and one quart of water". . . . This may become the SIMPLEST AND MOST VALUABLE PRESCRIPTION IN HISTORY—the solution to be used orally for burns and other types of shock. It could fill the need in case of mass disasters when parenteral saline couldn't be given to all those affected. . . . It is said to be palatable. The exact prescription would read "3 to 4 grams of sodium citrate per liter of water, with baking

soda used in place of citrate when the latter is not available." . . . As much as 10 liters of this hypotonic solution may be drunk in 24 hours by an adult. . . . The idea is that of Rosenthal, but the recommendation has been made by the potent Surgery Study Section of the National Institute of Health to the Surgeon General.

It seems good to see the name 'Dr. Clarence G. Salsbury' as an author in the ARIZONA PUBLIC HEALTH NEWS. His retirement from the Ganado Mission led to fears that Arizona might lose him. . . . The January issue of the 'News' also contains an article by Dr. H. G. Crecelius on Biological Warfare. If anyone wants to have more details, and can find the January 1949 issue of ARIZONA MEDICINE, there is a long editorial which gives a summary—up to date even now.

Theorists can make a treatment appear rose-colored. Then comes a realist, without the proper glasses, and the thing seems gray again. . . . After the hopeful reports of the salvage among narcotic addicts, Frank Sain, warden of the Chicago House of Correction, says "From my 30 years of experience I do not believe that there is a permanent cure for a confirmed narcotic addict." . . . Dr. Edward Helleher, who directs the Municipal Court's psychiatric institute, agrees. He lays the blame on a failure to follow up psychiatric treatment. The cause? Same old lack of psychiatrists and funds.

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## SOMAPSYCHIC MEDICINE

LLOYD F. SMITH, M.D.

Monrovia, California

No doctor need ever suffer from boredom. Every patient that walks into his office will offer a tremendous challenge to his ability to diagnose and to treat a sick human being. And since humans are infinitely complex their illnesses can achieve a bewildering variety.

Yet beneath diversity three similar problems appear to underlie most sickness. Most patients will present physical signs, emotional reactions, and mental problems. For instance if a man comes in with a broken arm he may show us his crooked arm as a physical sign, worry about his job as an emotional reaction, and wonder about future use of his arm as a mental problem. In the same way a woman with a severe cough may have the cough as her physical sign, fear of tuberculosis as an emotional reaction, questions of how to get rid of her cough as a mental problem.

No wonder that doctors take for granted that we all have three more or less distinct parts,—body, emotions, mind. As a result scientists began to parcel out to specialists different bits and pieces to study. This schizoid program had curious results. Our universities turned out psychologists who analyzed our minds. Psychiatrists delved into and prodded around emotions. Plain doctors felt obliged to confine themselves more and more to patients' bodies.

After this folly reached its peak, there came a reaction. In the decade from 1930 to 1940 there gradually evolved a program to reassemble the pieces and treat human beings for what they are,—individuals. Even the word gives a clue, for individual in its original meaning means something not divided. So this new movement of trying to see the whole as well as the parts came into prominence, and took the name of Psychosomatic Medicine. The first journal devoted to Psychosomatic Medicine came out in 1939, and the first textbook in 1942.

If we come back to the three supposed parts that make up each of us,—body, emotions, mind, we get some idea of how complex things grow. We now have at least six relations to study. 1) How emotions react on the body. 2) How emotions react on the mind. 3) How mind affects the emotions. 4) How mind affects the body.

5) How the body influences our mind. 6) How the body influences our emotions.

In theory Psychosomatic Medicine would embrace all these six relations, unite them, and make us again individuals. In reality it failed to do so. Apparently that was too big an order for any one movement. What happened was that Psychosomatic Medicine confined itself for the most part to the first of the six relations,—how emotion reacts on the body.

So the bulk of work in Psychosomatic Medicine concentrates on such problems as the way emotions can bring about a duodenal ulcer or a rise in blood pressure. Or it deals with emotions in our choice as well as our digestion of food, emotions in asthma, emotions in migraine and so on.

Perhaps we err, but it would almost seem as if the very word 'Psychosomatic' exerts a tyranny of its own. Made up of two parts, psyche and soma, the psyche obviously takes precedence over the soma. The psyche roughly covers what we mean by emotions and mind, the soma refers to the body. Thus it may be more than coincidence that Psychosomatic Medicine looks at patients to see how emotions influence our bodies, not vice versa or how body influences emotions or mind.

Yet nothing is more certain than that body and mind are closely allied. The same goes for body and emotions. Defects of body can produce both emotional upsets and insanity. And in literal fact our food, both that during our prenatal state and that taken after birth until death, decides not only our physical health, but our emotional status and mental condition. It would seem that the next accent in medical lore might stress that prenatal and postnatal food has a decisive role in our physical development, and our physical state in turn rules much of our emotional and mental life.

The failure both of psychology and psychiatry to put enough attention on what we eat and what food goes to make up our body may explain some of their failures. Any real approach to a genuine preventive medicine must start with basic things like food, and the composition of our bodies. The well-known and often

quoted saying of Brillat-Savarin, "Tell me what you eat, and I will tell you what you are" (1) has more truth than humor.

We doctors will have to pay more attention to the tissues and food of mothers, before, during and after pregnancy. For in the prenatal period babies lay down the basic pattern of their bodies once and for all. After birth we continue to fill in the outlined sketches. Our building material in both instances is food. When the day comes that doctors generally will accept this obvious approach to preventive medicine the term 'Somapsychic Medicine' may serve them. In that term "soma" or body comes before 'psyche' or the emotional-mental complex. Since we so often blindly follow the assumptions of language, as every student of semantics knows, the term 'Somapsychic Medicine' may keep reminding us where to start.

Non-medical writers at times appear to know the decisive role played by food. I know of no better example than Dana's "Two Years Before the Mast". On the voyage home Dana's ship had many cases of scurvy. Besides a masterful description of the physical signs of scurvy, Dana carefully says that victims of scurvy "lost all strength and spirit." Then after describing how they wolfed down raw onions and raw potatoes, or in advanced cases just the juice, Dana points out the change, both physical and emotional. "From lying helpless and almost hopeless in his berth, he was at the mast-head, furling a royal" after ten days on raw vegetables. (2)

Novelists too instinctively seem to know that food alters our actions. A classic example comes in Dostoyevsky's "Crime and Punishment." Raskolnikov, the main character, commits two murders. A friend, Svidrigailov, tries to console Raskolnikov's sister and to explain how such things could be. Svidrigailov gives one partial cause as "nervous irritability from hunger." (3) Besides this explicit statement, all through the book Dostoyevsky time after time shows that the murdered ate unwisely when he did eat, and often ate nothing at all.

Another overlooked instance of the relation of food to emotional and mental life can be found in all the higher religions. By higher religions we mean those that aim at a non-material or spiritual goal. Here we find many rules about food such as those in the Old Testament. (4). Yet most of these appear based on a

desire to set certain customs and habits for its members.

On the other hand most higher religions embrace a certain number of mystics. Mystics have been prominent in every higher religion from Bernard of Clairvaux and Francis of Assisi to the numerous Hindu mystics. Without exception mystics seem to agree in this, that they live on a deficient diet during the period of their mystical experiences. Mohandas Gandhi offers a recent example, with his long fasts alternating with longer stretches of marginal feeding.

Most admirers of mystics seem to take for granted that mysticism itself decreases the need for food. Yet another way of looking at the same facts might be equally valid, and capable of more scientific value. In the light of what we know of the effects of semi-starvation, may not mysticism itself be an effect of food lacking in quantity and quality? An interesting book could be written to give evidence that mystics get that way from inadequate diet.

Research on the effect of food in its relation to how we feel and how we think has lagged behind. Even so the little we do know gives an impressive amount of data that needs emphasis. The old tradition that mind dominates matter gains little support from modern science. As we watch how food rules the way we think and feel, our wonder grows that we neglect this viewpoint.

Cretinism affords a simple example. A cretin's birth is due in large measure to a lack of iodine during fetal life. Boyd describes him well. "The cretin is a dwarf physically and mentally. The mind, the skeleton, and the sexual organs do not develop. . . . He is a sad, old child . . . the pariah of nature, and all for want of a little iodine." (5). In this instance, at least, mental development fails along with the failure of an adequate amount of a simple food, iodine.

Pellagra shows us how a mind once sane can drift off into insanity, due to a defect of diet with its results of a sick body, emotional upheaval, mental imbalance. Pellagra also serves as an example wherein early treatment by proper food can cure body, emotions, and mind. Gaspar Casal, of Oviedo, Spain seems to have first discovered "Mal de la Rosa," now called pellagra. His book, however, did not see print until 1762. (6).

Meanwhile the Frenchman, Francois Thierry,

after working with Casal published his paper on pellagra in 1755. (7) And the Italian, Francesco Frapolli, followed with a paper in 1771 that both named the disease pellagra, and described it. (8).

Besides the physical signs, Thiery notes explicitly that pellagrins are "sad and melancholy . . . shedding tears and emitting cries without any object." Casal speaks of the way "heaviness . . . attacks them and causes them to give way to a sad crying." Frapolli goes into detail and writes, "Now the patients first begin to suffer in the head, anxiety, depression, sleeplessness, dizziness, cloudiness of mind . . . hypochondriacal delirium . . . and sometimes to suffer mania." Frapolli concluded "all then is in agreement in considering the bad food as the principal cause of the disease." He adds a wry postscript, "and then each accuses something else in the disease according to the customs of his country."

Today we have nothing to contradict and relatively little to add to what these pioneers discovered. Sebrell of the U. S. Public Health Service sums up the symptoms of pellagra. (9). Early pellagrins show nervousness, dizziness, headaches, fear. Later they hallucinate, make up wild tales, do not know where they are, cannot remember, get confused, fall into depression or rave in mania.

As Sebrell points out, the insanity of pellagra is the first mental disease known to come from poor diet, and curable in the early stages by improved nutrition. Sebrell suggested that possibly changes of the nervous system are due to a thiamine deficiency, while the mental changes may come from the nicotinic acid deficiency.

Turning to what we call emotional disturbances, Dr. Spies and his co-workers reported an interesting experiment. (10). They took 115 patients on a known deficient diet, but with no clinical signs. These 115 patients showed chiefly emotional upsets, such as fear, anger, hostility, depression, anxiety, and inability to pay attention or understand. Each patient got an injection of 50 mgm. of thiamine into a vein.

Within 30 minutes to 20 hours their 'emotional' symptoms subsided. The authors infer that such rapid change showed that no or minor structural change has occurred. They ran controls with injections of normal saline and found no results. They also found that the thiamine injections helped both those with known neurotic

backgrounds and those reasonably normal in previous medical history.

A more carefully controlled experiment has been reported by Dr. Wilder of the Mayo Clinic. (11) He isolated eleven women volunteers in a separate section of a mental hospital under complete control. These women had been previously hospitalized for mental illness and had got back to about normal. So each woman acted as her own control, since they knew her behavior for a long time before, during and after the experiment.

The eleven women had meals prepared to give less than one half a milligram of thiamine daily. Otherwise their meals sound fine, with plenty of beef, cheese, skim milk, fruit and vegetables. Also the volunteers got adequate Vitamins A, C and D, and considered B as brewers yeast. The brewers yeast was autoclaved to destroy most of the thiamine.

Every doctor sees many a patient who does not appear to eat half so well. Yet in a period of from 93 to 196 days every woman had to quit such a diet, since she could no longer eat it, or would vomit if she tried. Each woman in turn became irritable, depressed, quarrelsome, fearful, unable to concentrate, confused. None of these symptoms showed up at the start, but only after weeks on the diet. Thiamine restored to the diet without the patient's knowledge got rid of the symptoms.

From work like this Dr. Wilder inferred that the psychologic parts of pellagra and such deficiency diseases may come from a lack of thiamine. At least this seems certain. Inadequate diet shows itself very often by psychological symptoms. Both in animals and in humans often the first test of poor food may be abnormal behavior. Wilder goes so far as to suggest that if we tell a funny story and our patient fails to laugh we may suspect pellagra. To me this credits doctors with more skill in story telling than most of us can honestly claim.

Dr. Jolliffe and his associates reported 150 cases in which patients showed clouding of consciousness, cogwheel rigidity and strong reflexes to grasp and suck. (12). These scientists found that fluids and nicotinic acid reduced mortality and concluded that the syndrome showed a total lack of nicotinic acid.

Kreisler and others proved that to restrict the B complex vitamins induced severe primary mental changes in psychotic patients, or made

worse the existing psychotic trends. (13) They also believed that the kind of change depended on how restricted was the amount of B complex.

Up to the present most of the work on the relation of food to nervous and mental disease centers about vitamins, and especially about the vitamin B group. One report states that Vitamin E was tried out on random patients in institutions for chronic mental disease. (14). About 20% of patients showed clinical improvement, with best results in patients depressed, agitated, unable to express themselves in words.

Apart from vitamins the only other food substance tested for its relation to the mind seems to be glutamic acid. This amino acid roused interest after it was found to be the only amino acid metabolized in vitro by brain sections. On rats glutamic acid feeding seems to prove without effect. (15). Yet studies on humans have been done. Glutamic acid was given to 69 patients with convulsive disorders and varied degrees of intelligence. After one year 30 of these patients showed a gain of 11 points in I. Q. for the first six months, with no significant change after that. (16).

Another experiment on eight mental defectives reports great improvement by feeding about 10 gm. of glutamic acid daily for some months. (17).

When you review these and similar studies you soon begin to be impressed with this fact,—we have abundant evidence that how we feel and how we think bears some relation to what we eat. After this first reaction we next realize how comparatively insignificant is our knowledge of the relation. Most of what we know centers around the vitamins and how they affect us. The next step might well be one of total bewilderment. If food can exert such control not only on our bodies, but on our very emotional and mental health or disease, where do we get the courage to tamper endlessly with our food? Future historians may never cease to wonder how we in this day and age blithely process food though we know so little of what we are doing.

Even in the B group of vitamins, where relations of deficiency to mental and nervous disease are known, we have a gay abandon all our own. The cereals, and in our culture especially wheat, have long been a mainstay for the supply of B vitamins. Yet we have amazing skill in taking the natural B vitamins out of our flour products.

We salve our consciences by feeding these vitamins to animals. And then we put back into our flour a couple of synthetic vitamins and call such flour 'enriched'.

How do we explain this anomaly? No nation in history has been so overstocked with food for so long a time as we in America. Yet we all are not well fed. Only a doctor whose single criterion of food deficiency is death by starvation would fail to admit that the vast majority of patients we see, of all gradations of income, are poorly nourished. And like the Bible says of the number of fools, the number of neurotics is also infinite.

Some day we must call a halt. Food processing today has run beyond any sensible limit. The Roman army conquered its empire on a diet heavily dependent on wheat. A reincarnated Roman soldier might never recognize its modern equivalent, similar in name only, after it gets through its processing.

Wheat serves merely as an example. Sugar, processed from every trace of value except calories, rivals wheat as our modern fraud and curse. So it goes. Patients come to us who seldom, and at times apparently never, eat anything but processed food. We can ask if this be progress. Dr. Price (18) and others have shown beyond reasonable doubt that races of exceptional bodily health and nervous-mental stability have lived on unprocessed foods. These same races uniformly begin to deteriorate when they accept our processed foods of commerce, white flour, sugar and their countless combinations.

Medical practise grows more and more wrapped in the obvious. The skin specialist concentrates on his x-ray treatments and his lotions. Child specialists worry mostly about canned milk and canned food and shots against diphtheria, tetanus and whooping cough. Obstetricians go into a huddle about drugs to relieve pain instead of preparing women to reach the bodily perfection that might make childbirth a normal function.

Surgeons try to cut out or, with needle and thread, alter what we find objectionable. Internists with their needles want to improve our glands or restore organs beyond repair. Psychiatrists arrange our complexes into some kind of order, at times having to push and pull in order to fit them to their theories. We country doctors sit around and hope for the best, and

await the next antibiotic that will cure all ills of the flesh and spirit.

It begins to look to me as if we need a lot of change in medical practise. From my view of things the path appears something like this. We might start with the soil and begin to produce quality as well as quantity in our edible plants, and the same in our animals and animal products that we use for food.

Next we could call a halt on most types of food processing. We must abandon our present policy of allowing our foods to be processed to death. At the moment the whim of any company decides what to take out or what to add to our so-called foods. The only apparent limit to what a food processor can do seems to be what we can prove is actually poisonous. Right now we seem to act on the principle that we cannot ban any depletion of a natural food or the addition of any chemical to 'food' until many research men prove the change actually harmful. It was not until research proved that removing the hulls of rice killed and sickened countless humans that we even questioned this processing. We had to wait until 'butter yellow' was shown to produce cancer in animals to get this dye stopped. Not until 'agene' proved too well its ability to atrophy brain cells and kill dogs did we inquire as to its wisdom in flour for human use.

Some day we must put a limit to the advertising that persuades housewives to buy and feed us the food trash that fills magazine pages with its false claims. Or, failing that, we doctors must lift our timid voices in protest against all the hokum advertising about processed foods.

Finally we must begin to educate ourselves and our patients on what foods have real nutritive value, how to keep them in our homes, and how to serve them. Most of our families do at least as much harm to food once inside their doors as the combined skill of food processors along the way from farm to icebox. Cooking unwisely and too much has crippled far more of us than our automobiles have maimed.

If we grow our food better, do not tinker with it foolishly, but get it inside of us with a minimum of fussing, we certainly can improve our physical health. In any rational sort of preventive medicine, decent food for all of us must come first. After that we can count on a decrease in mental and nervous disease.

Should such a program ever appeal to enough

of the medical world we might call it 'Soma-psychic Medicine'. That would keep in mind that health of body must precede health of our emotional and mental life. The next fifty years may decide whether or not our nation and our way of life can survive. We had better start to look at the simple, obvious facts that concern our bodily-emotional-mental status. We could begin to pay more attention to our soil that provides our food, and the food that goes into our mouths.

Every nation that has come to grief in historical times has done so in part through some failure in its food supply. Generally this has been through soil depletion and erosion. By and large historians, a bookish lot, fail to see this. Even the learned Toynbee appears to miss it. (19). Yet Toynbee knows that the 'stimulus of new ground' has brought a surge of vitality, as in early America. But he rather gives this a mystical value rather than seems to realize that virgin soil provides unspoiled food, and unspoiled, abundant food offers health to body and emotions and mind.

Our land potentially can furnish abundance of food and of good quality. To tamper recklessly with food invites disease not merely of body, but of all that we are. In large measure we are what we eat, body, emotions, mind. Should we decide to continue in our present hit-and-miss fashion, with its tragic results, at least we should know what we are going, risking personal and national health. In the years of decision that await us, such a course appears to lead along a dangerous road.

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## PERSONAL NOTES

*Dr. Joseph M. Greer*, Phoenix, spoke at the January 15th Staff Meeting of St. Joseph's Hospital on "Procurement of Medical Personnel." He attended as Arizona representative of the advisory board of selective service, a meeting held in Washington, D. C. January 12th and 13th. In essence he said that, according to present concepts, doctors would be eligible for service if they could stand up, could breathe, were warm, and were not expectorating tubercle bacilli.

*Dr. Dermont W. Melick*, Phoenix, took over the presidency of the Maricopa County Medical Society at the January 8, 1950 meeting, and outlined what he hoped to accomplish in the present year.

*Drs. Wallace Meyer*, and *Alfred D. Levick*, Phoenix, discussed a color-film on Anorectal Diseases at the January 29, 1951, Good Samaritan Hospital Staff meeting.

*Dr. C. Thomas Read*, Phoenix, presented an extremely interesting paper on "Usages of Streptokinase and Streptodornase" at the St. Monica's Hospital Staff meeting January 21, 1951.

*Dr. Fred Holmes*, Phoenix, presented "Medical Aspects of Cardiac Trauma" at the St. Monica's Hospital Staff meeting January 21st.

*Dr. Daniel J. Condon*, Phoenix, has left his practice, January 15, 1951, for Cambridge, Massachusetts where he will spend 18 months studying Forensic Medicine. He has been awarded a Research in Teaching Fellowship in the Department of Legal Medicine.

*Dr. Arthur C. Carlson*, who has been licensed to practice medicine in Arizona for many, many years, and who was formerly of Jerome and Cottonwood, and of the Yavapai County Medical Society, is now practicing in Phoenix, Arizona.

*Dr. Clarence Salisbury*, Phoenix, Chief of the Bureau of Preventive Medical Services, State Department of Health, has been appointed to the executive Board of the Cancer Detection Center St. Monica's Hospital. Other members are *Drs. Douglas Gain*, and *Thomas Woodman*, Phoenix.

At the February 5th Maricopa Medical Society meeting, the forthcoming Maricopa County Tuberculosis Survey was discussed from an organizational standpoint by *Dr. Lloyd K. Swasey*, Phoenix. *Dr. Simon Abrams*, of the U. S. Public Health Service discussed the expected

numbers of chest surveys (about 233,000) the expected numbers of active T.B. cases to be anticipated, the general mechanics of how the survey will be accomplished, and what the part of the Maricopa County Physicians will play in the study.

*Drs. Rupert T. Rainey*, Los Angeles, formerly of Phoenix, and *Dr. Howard Brown*, San Francisco, both renowned neurosurgeons, gave and discussed papers on "Lumbar Sympathectomy" at the Scientific session of the Maricopa County Medical Society February 5th.

*Dr. Robert L. Maresca*, formerly associated with the Veterans Hospital Papago Park, and then limiting his practice to anesthesia in Tucson, Arizona, has established a private practice of anesthesia now in Phoenix with *Drs. Benjamin Herzberg* and *Morris E. Stern*.

Testimony of George F. Lull, M.D., Secretary and General Manager of the American Medical Association on Sec. 23 of S.1 (Amended) Before the Preparedness Sub-Committee of the Senate Armed Services Committee—January 30, 1951.

Mr. Chairman:

My name is George F. Lull. I am the Secretary and General Manager of the American Medical Association. I desire to submit the following statement in opposition to Section 23 of Senate Bill 1. I understand that other representatives of the Association will appear regarding some of the other features of this bill.

SECTION 23, S. 1, authorizes the President to socialize medical care and hospitalization for a large segment of the population by providing for the physical and mental rehabilitation by the Federal Government of registrants who are rejected for failure to meet standards for physical and mental fitness prescribed by the Secretary of Defense. This is a request by the Executive Department for vast new powers and federal expenditures in an area only remotely connected with defense. Here, in the guise of a national defense measure, is a new health proposal that surpasses, in the extent to which it nationalizes medicine, even the compulsory health insurance bills that have been introduced for so many years.

The American Medical Association thoroughly supports the concept that those individuals who cannot meet the physical and mental requirements of Selective Service should be rehabilitated, but it equally strongly opposes the idea embodied in Section 23 that this responsibility belongs to the Federal Government. It believes that such individuals should seek rehabilitation

from the many sources of medical and hospital care that already exist and that those sources can be mobilized in a voluntary way to provide the services necessary at a cost that registrants can afford.

The members of Congress are aware of the attitude of the American Medical Association toward the socialization of medicine and of the vigorous campaign we have waged to arouse public opinion to its danger. We have called the attention of Congress and the Nation to its exorbitant cost, its perversion of the physician-patient relationship, its regimentation of a free profession, the inevitability of political domination and interference in the field of medical care, the vagaries and administrative complexities inherent in the bills that have been proposed to establish it, the tragic experience of foreign nations where it has been attempted, the socialist and, often, communist associations of many of its sponsors and many other adverse characteristics. Over 10,000 organizations have seen fit to support the doctors in this struggle against socialism in a significant sector of American life, and the Congress, thanks to many members of this committee, has expressed the same vigorous attitude by refusing to support certain executive reorganization proposals that would have placed the would-be socializers of

medicine in a more strategic position from which to conduct their campaign.

The effort to utilize an important defense measure to promote a wide expansion of government medicine is a flagrant attempt to circumvent the will of Congress and of the people. It represents a disregard for public opinion that bodes ill for the future of our country and it must be prevented. If this extensive federal program costing billions of dollars is set in motion, it will eventually destroy the present framework of medical care that has placed the United States of America in its present enviable position among the nations of the world and replace it with a rigid, government controlled system.

The American Medical Association and its 53 constituent and 200 component societies stand ready to direct their resources to the development of a rehabilitation program for registrants with physical or mental defects that are remediable. We would be happy to cooperate with the Selective Service System and the Secretary of Defense in developing such a voluntary program, which would retain the present American system of medical care.

We urge the committee, therefore, to delete Section 23 in its entirety as unnecessary, costly in its activation and drastic in its implications.

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## WOMAN'S AUXILIARY



Mrs. A. J. Bosse  
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Mrs. Bosse is a native of Wisconsin and took her nurse's training at the Milwaukee County Hospital. She was married to Dr. Bosse in Wisconsin and they came to Arizona seven years ago. They have four children.

The Gila County Auxiliary held its first meeting in January at the Cobre Valley Country Club in Globe. They met at dinner with the doctors and each group held its individual meeting thereafter.

Much time was given to discussion of a gift to be given to the new Gila County Hospital and a committee was appointed to investigate.

Mrs. Clarence Gunter, Public Relations chairman, is to map out a public relations program to best suit the needs of the community and to begin work immediately.

Mrs. Charles Collopy was appointed legislative chairman and Mrs. Ira E. Harris, chairman of Today's Health. Four subscriptions to the publication were sold and the group has subscribed one hundred per cent to the Bulletin with thirteen subscriptions.

### LEGISLATION

Substitute Senate Bill No. 1 has been introduced in the United States Senate and its con-

tents are of some concern to us.

In general this bill deals with universal military training, 18 year old draft, and sundry other "allied" subjects. It is to some of these latter sections that the American Medical Association has taken a definite stand because it believes that they are inimical to the best interest of our country. These are as follows:

1. The bill calls for a limit of 75,000 annual deferments for all classes of students. The American Medical Association feels that no specific limit should be set on student deferments, the figure should be left open so sufficient physicians and other professional personnel can be turned out to meet the country's actual needs, whatever they are determined to be.
2. The bill authorizes the President to provide for physical and mental rehabilitation of registrants who are rejected for failure to meet standards for fitness set by the Secretary of Defense. This covers medical or hospital treatment, including psychiatric care, in-or out-patient care, or other treatment, including necessary prosthetic devices. According to Dr. George F. Lull, Secretary of the American Medical Association, this is a request by the Executive Department for vast new powers and federal expenditures in an area only remotely connected with defense. Here, in the guise of a national defense measure, is a new health proposal that surpasses, in the extent to which it nationalizes medicine, even the compulsory health insurance bills that have been introduced for so many years.

By the time this is published it may be too late to write to your congressman, but if this bill has not already been passed it is important that you voice your opinion to your legislators.

### MEETING OF THE EXECUTIVE BOARD OF THE WOMAN'S AUXILIARY

The executive board of the Woman's Auxiliary to the Arizona State Medical Society met February 6, 1951 at the Hotel Westward Ho. The meeting was preceeded by a brunch. Highlights of the meeting are as follows:

To date, one hundred five Bulletin subscrip-

tions have been sold. This does not represent a sufficient number of subscribers as compared with membership, and it is hoped that more members will subscribe to this important and informative National publication.

Nurse's Loan reported that to date four girls have been given financial assistance—two beginning students, and two who are completing their training. This committee will begin to work immediately to secure new applicants.

Today's Health reports an approximate two hundred ninety-seven subscribers—work to continue to increase the number. Articles in the magazine are varied, interesting and authentic and it is hoped that those who subscribe will help to bring in other subscriptions. There are a number of gift subscriptions to public schools. Check was made on the schools and it was interesting to note the keen appreciation for the gift and the fact that the magazine was widely used. The membership is urged to further distribution of this excellent publication.

The Legislative chairman had prepared and sent to all County members and members-at-large for their information, a mimeographed report on the bills introduced and those approved by the State Society, in the 20th Legislature. She also sent word asking all women to write to their legislator immediately, urging the full appropriation of \$500,000.00 for the Children's Colony. Completion of the Children's Colony is a project the Auxiliary has been interested in for many years.

Inasmuch as the National Auxiliary is planning to compile complete histories of all State Auxiliaries, the Historian requested each county publicity chairman to gather together such material immediately and submit it to her. She asked for cooperation so that she can meet the National date and also have the State file up-to-date before convention.

State convention was discussed—Mrs. Joseph M. Kinkade of Tucson, appointed chairman. Tentative convention dates for Auxiliary activities are set for April 29, 30, May 1 and 2, 1951. Convention news will follow in Arizona Medicine and via special bulletin. The National Auxiliary President, Mrs. Arthur Herold, has accepted an invitation to attend convention, and Mrs. Herzberg urgently requested that all members make plans to attend convention sessions.

Those who attended the board meeting were: Mrs. Benjamin Herzberg, Mrs. Royal Rudolph,

Mrs. Delbert Secrist, Mrs. Brick P. Storts, Mrs. George Enfield, Mrs. Joseph Kinkade, Mrs. Louis Hirsch, Mrs. Joseph Ehrlich, Mrs. Archie Cru-thirds, Mrs. Donald Carlson, Mrs. James R. Moore, Mrs. Roy Hewitt, Mrs. Karl Harris, Mrs. Carlos Craig, Mrs. Jesse Hamer, Mrs. Thomas Bate, Mrs. R. Lee Foster and Mrs. Harry Southworth.

### THE AUXILIARY TO THE MARICOPA COUNTY MEDICAL SOCIETY

The Auxiliary to the Maricopa County Medical Society held its February meeting in the Nurses' Lounge at Good Samaritan Hospital.

Mrs. Royal W. Rudolph, president-elect of the State Medical Auxiliary, gave a report on the 1950 mid-winter conference in Chicago, and discussed the highlights of national work.

Following this, Dr. Lloyd Swasey reported on the coming Maricopa County Chest X-Ray Survey. He introduced Mrs. Margaret Casoon who talked on the nurses' work in connection with this, and Mrs. Olga Welsh who discussed the social work. Dr. Simon Abrams, of the U. S. Public Health Department, gave the results of previous surveys and told what might be expected of this one. Mrs. Karl Harris, president, asked that members of the Auxiliary volunteer to help with the survey in each of the eight districts.

In the absence of Mrs. Donald Polson, chairman for Red Cross in the Auxiliary, Mrs. Jesse Hamer announced that the Red Cross drive had started, and that again this year the doctors were being approached by members of the auxiliary for their contributions. Last year participation was tripled and the amount contributed was doubled.

Mrs. Karl Harris read a letter from the Y.W.C.A. telling of a course they will soon present . . . a study of all the welfare agencies in the city. They would like to enroll some representatives from the Auxiliary.

At the conclusion of the meeting, Mrs. John Findley, hospitality chairman, introduced four new members: Mrs. Raymond Huger, Mrs. David Long, Mrs. Alloys Tallakson, and Mrs. Donald Victor.

Refreshments, in the Valentine theme, were served by a committee headed by Mrs. William A. Bishop.

## PIMA COUNTY NEWS

The January meeting of the Pima County Medical Auxiliary met at the home of Mrs. Royal W. Rudolph. Hostesses for the evening were Mmes. F. G. Leseman, Jr., Louis Hirsch, Henry Limbacher, Edward Hayden and C. E. Bensema.

The Auxiliary group canvassed the doctors for contributions to the Community Chest and Mrs. Kenneth Baker announced that they had gone over their quota.

One Hundred Dollars was contributed to the school health council for its revolving health fund, and twenty-five dollars was voted to the visiting nurse service for medicines.

Mrs. Royal Rudolph, President-elect of the State Auxiliary, reported to the group on the Seventh Annual Conference for State Presidents and Presidents-elect, held in Chicago. Her report was enlightening and interesting.

Committee reports were given.

## FEBRUARY REPORT OF PIMA COUNTY MEDICAL AUXILIARY

Mrs. Benjamin Herzberg of Phoenix, State President of Woman's Auxiliary to the Arizona Medical Association, was guest of honor Tuesday, February 13, 1951 of the Pima County Medical Auxiliary at a luncheon at the Tucson Country Club. Mrs. Herzberg gave a most interesting and inspiring talk making us all more determined to be better informed Auxiliary-wise.

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Mrs. James R. Moore of Phoenix, State Historian, also attended the luncheon.

Hostesses included: Mrs. Delbert Secrist, Chairman, Mmes. Joseph Kinkade, Donald Schell, Donald Lewis, Stuart Sanger, William Carrell, James Sickler, Jackman Pyre, Michael Bernfeld, and George Shetter.

While in Tucson, Mrs. Herzberg conferred with Mrs. Joseph Kinkade, Convention Chairman, on plans for the State Convention to be held in Tucson April 29, 30, and May 1 and 2. Margaret Flood, Pima County Publicity Chairman.

## YAVAPAI COUNTY AUXILIARY

The Woman's Auxiliary to the Yavapai County Medical Society met for dinner at the Hassayampa Country Club January 11th. Mrs. Benjamin Herzberg, state president, and Mrs. Royal Rudolph, state president-elect, were honored guests during the evening.

Mrs. James H. Allen, president, announced that fifteen dollars, seven baskets of food, canned milk, and twenty three packages of toys were given to the Salvation Army at Christmas time.

Plans were made for the annual rummage sale to be held February 15, 16, 17, at the Woman's Club House. Mrs. Joseph McNally was appointed chairman.

Proceeds from a bridge and canasta party will be given to the Nurse Loan Fund.

There were twenty three present for dinner and the business meeting. Two guests were wives of doctors serving with the armed forces.

Everyone enjoyed hearing Mrs. Herzberg and Mrs. Rudolph, both of whom brought us news from the national, state, and county auxiliaries.



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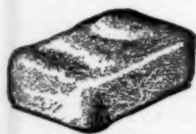
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